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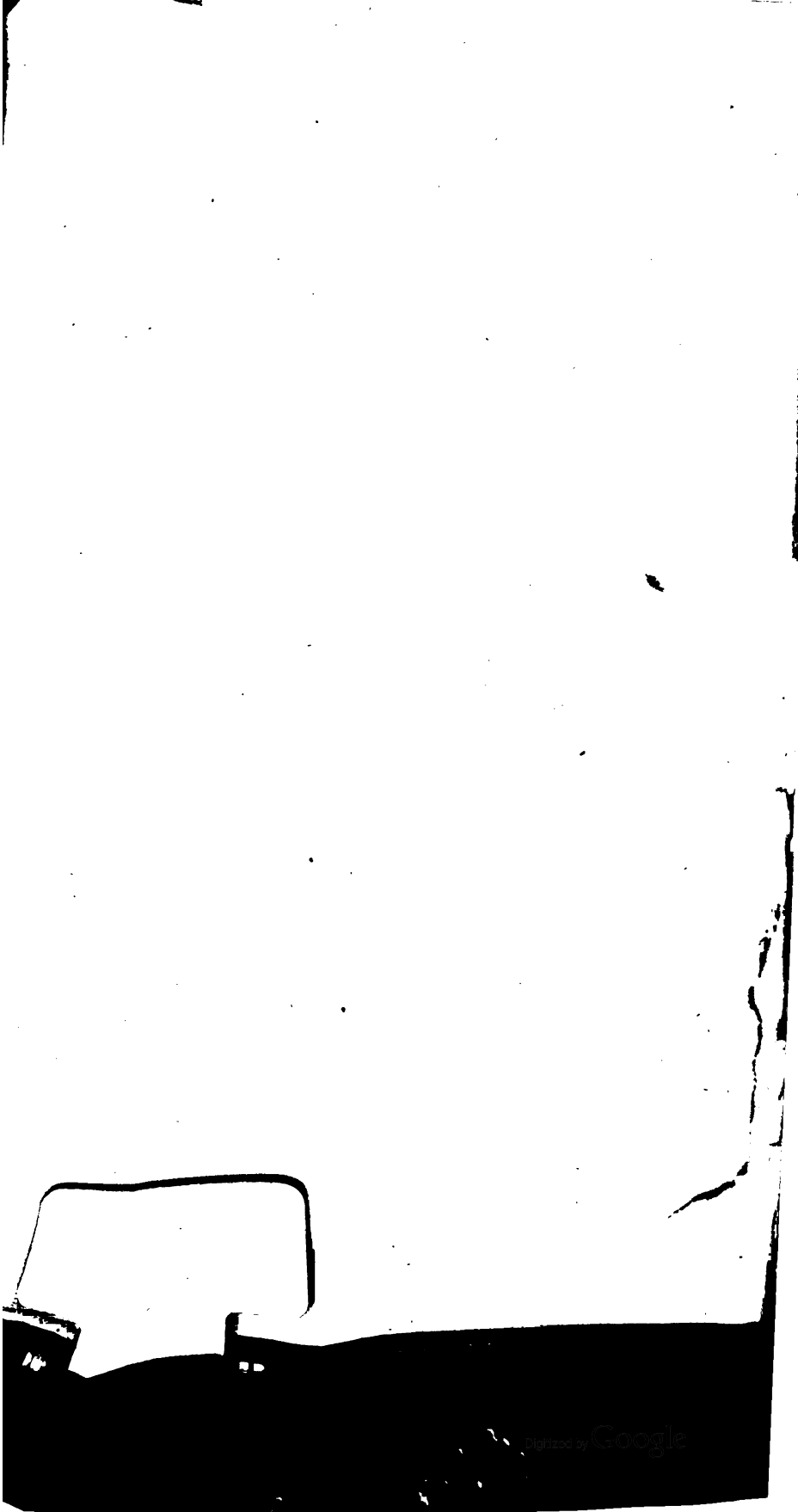
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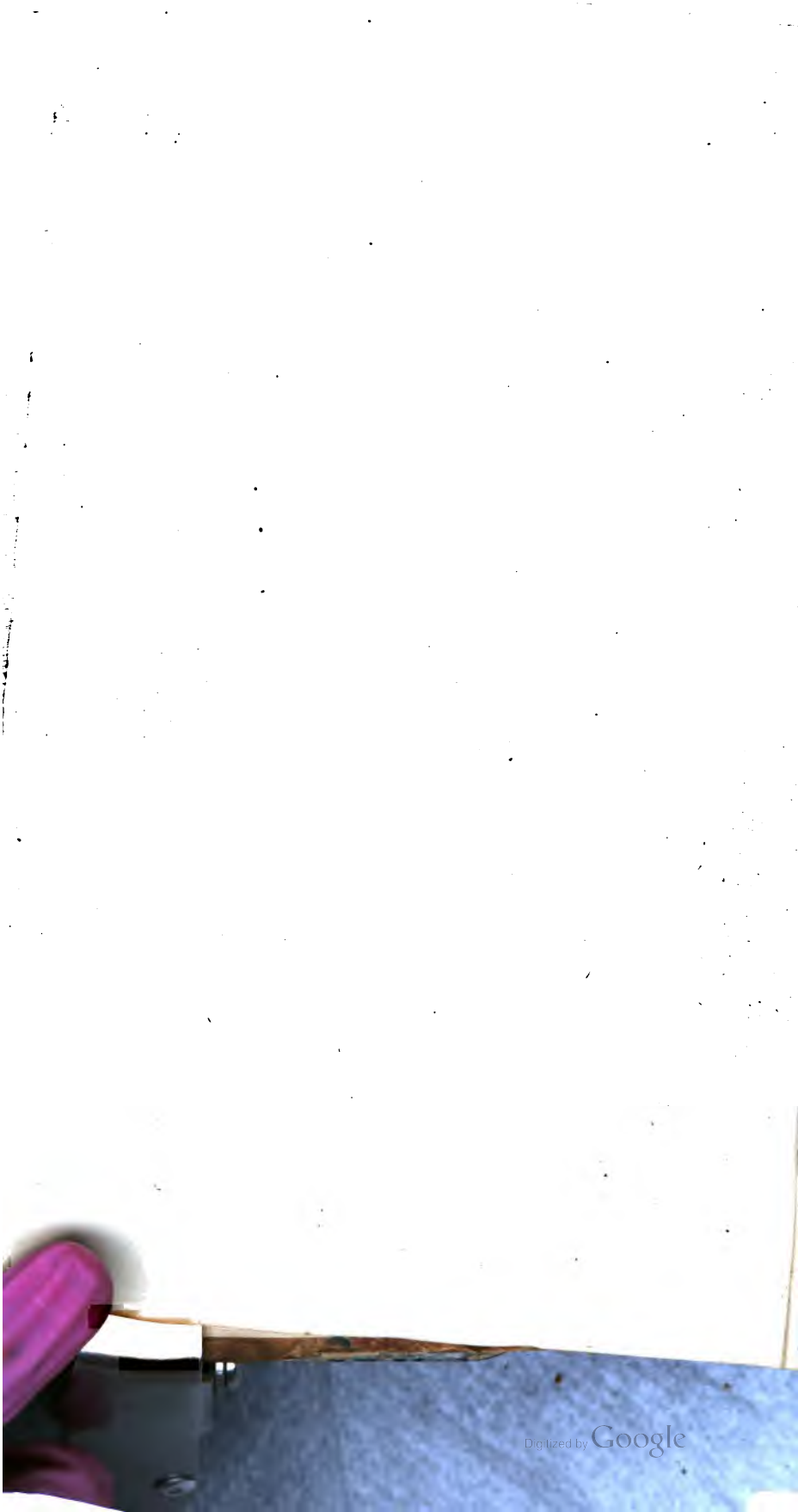
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THE MEDAL OF THE SOCIETY.

MODELLED BY JOHN FLAXMAN, R.A.

EXECUTED BY G. F. PIDGEON & ENGRAVED BY ANKER SMITH, A.R.A.

FROM A DRAWING BY MARIA DENMAN.

Published as the Act directs July's 1808.

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subjects having been placed under the several classes into which the business of the Society is divided. The Premiums offered for the session commencing in October 1807, and the Rewards bestowed in the preceding May, are the first in order; these are followed by a list of the Rules and Orders of the Society, corrected pursuant to the several alterations which have been found expedient during the progress of the Society.

The Plantations of the Right Honourable the Earl of Fife, appear to answer the most sanguine expectations of their noble owner; and in the counties of Banff, Aberdeen, and Murray, are said to amount to above thirteen thousand acres. His Lordship has set an example highly worthy of imitation.

The unremitting attention of David Day, Esq. to his Plantations of Ash Trees, has produced proofs of the great emolument arising to the owner from planting Ash Trees in a proper manner; and probably no means can be pointed out of a more certain and valuable property being raised with less trouble and more pleasure, than by the method he has here shown, and confirmed by long practice.

The Chinese method of propagating Fruit Trees by abscission, will be found deserving of trial in this climate; and there is much reason to suppose it would in many cases be followed with great success.

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Great deceptions have been practised by the purchasers of growing Timber from the planter, who, in some instances, have bought it for half the real value; the instrument, invented by Mr. Broad, for the Measurement of growing Timber, will render it easy for the value to be better ascertained by the proprietors of plantations.

The advantages of Irrigation of Land, where there is a command of water, has been fully shown in the former volumes of the Society's Transactions. The adjustment of the proper level to allow it to pass over the land, in a regular manner, is important; and the instrument invented by Mr. Drew is cheap and simple, and likely to conduce much to such improvements.

The Hatching of Chickens in Ovens has been pursued with success in Egypt for many centuries, and Mr. Reaumur, the celebrated French Academician, has strongly recommended the practice in Europe, and laid down many excellent rules for its accomplishment; but Mrs. D'Oyley has effected the raising of Poultry in a more certain and natural mode, which would afford an easy, pleasant, and profitable business, to many persons in the environs of London, and populous towns, and which might be attended to by females incapable of laborious employment.

Major Spencer Cochrane's Paper on the Growth of

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Spring Wheat, and the Culture of Poppies, contains many useful hints upon these subjects. When it is considered that excellent opium has been produced from poppies grown in England, that the seeds of the poppies are a useful substitute for almonds in emulsion, and good for other medicinal purposes; and that the oil expressed from the seeds is equally nutritious, and frequently imported from Holland as Florence oil, and sold here as such; many inducements will be found, particularly during the present state of public affairs, to encourage an extension of the culture of this valuable plant.

Under the Class of Chymistry, the account of Lord Ribblesdale's Ore of Zinc, will engage the attention of both natural and experimental philosophers; the mode by which it was accumulated in the caverns where now found, there may be some difficulty to explain; and the various uses to which it may be applied, will interest the painter, the chymist, and the metallurgist.

Within the period of less than a century, Great Britain imported most of her Earthen Ware from foreign countries; but the improvements in our potteries have now rendered these articles a great branch of our foreign exports, even to the countries which formerly supplied us. The German Crucibles, and the different vessels for chymical uses, have, however, still continued to be imported hither. The inven-

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tion of Mr. Turrell will, probably, lead the way to our superiority in manufactures of chymical vessels.

The ingenious mode of Painting designed by Mrs. Hooker, in imitation of the ancient Grecian manner or encaustic painting, is curious and interesting; and the specimens she has produced, executed in this manner, display great ingenuity and effect.

Under the Class of Manufactures, Mr. Duff's invention for weaving Figured Work, has met with the approbation of many persons conversant in that line of business; and when it is considered, that the improvements in our machinery enable us to have advantages over all other nations in our foreign sales, we shall feel the necessity of giving encouragement to every invention that will contribute to maintain our superiority in commerce.

Under the head of Mechanics, the Society have paid uncommon attention to every thing likely to promote the interests of our navy; they are sensible that it demands the warm support of every man who wishes well to his country, and they are desirous of adding to its glory, comfort, and security.

The numerous accidents which occur in boats of common construction, have induced the Society to give their

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Gold Medal to Mr. Wilson, for a Boat which possesses great advantages either in embarking or disembarking of troops, in affording succour to vessels in distress, or in preventing accidents from carrying too great a press of sail. It unites the powers of a secure sailing boat, with more room and greater expedition, than other boats which draw the same depth of water usually possess.

The Capstan, invented by Mr. Boswell, prevents the delay and danger attending the use of common capstans, and does not require the messenger, or cable, coiled round it, to be ever surged.

The loss of many valuable seamen by falling overboard, when ships are under way in the night, engaged the philanthropy of Mr. Shipley, the worthy founder of the Society, to invent a method of rendering them assistance in such a dangerous situation; and the adoption, on shipboard, of his Floating Light, would save the lives of many of this useful class of men.

The machine denominated by Mr. Daniel a Life Preserver when shipwrecked, has already been the means of preserving several persons from drowning. The small space it occupies when uninflated, its lightness and security, recommend it to notice; and when it is considered that a single person getting on shore by the use of one of them, might

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might be the means of procuring safety for a whole ship's crew, as would probably have been the case if one had been on board when the Abergavenny East Indiaman was lost near Weymouth, this machine becomes an object of public attention.

To the late Lieutenant Bell, of the Royal Artillery, the Society are indebted for several useful mechanical inventions. One of which is the method of forming a connection betwixt a stranded vessel and the shore, by throwing a rope on shore by means of a shell from a mortar, as described in this and their tenth Volume. Various experiments were successfully made in this manner from a vessel in the Thames, in presence of a committee appointed by the Society; and in many cases the plan would be successful in rescuing the persons and valuable property on board from destruction.

The necessity of encouraging the Growth of Hemp for naval use, has not escaped the attention of the Society; who have experienced, that our possessions in Canada are well-calculated for its culture, but deficient in machinery for its preparation. The machine of Mr. Cleall's invention for easily procuring from the plant the seed in a state fit for growth, and the machine invented by Mr. Bond for breaking or separating the woody fibres from the filaments of the hemp, it is hoped will be the means of facilitating these objects;

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jects; and in furtherance thereof, the Society have ordered some extra copies of these papers to be printed for circulation gratuitously in Canada.

The unhappy situation of Climbing Boys employed in sweeping chimnies, has for several years induced the Society to attempt other means to effect the purpose; and in the 23d volume of the Society's Transactions, it will be found, that the Gold Medal of the Society was given to Mr. Smart for the greatest number of chimnies cleansed by mechanical means, without the assistance of any person within the flue. Much praise is due to this gentleman for the unremitting attention he has paid to complete machinery effectual for general use; and his machines are so perfected, as, in the opinion of the Society, to entitle him to the highest reward offered for implements and articles of this kind. For the Machine supposed next to his in merit, the Silver Medal has been given to Mr. Davis; and it is with pleasure that the Society understand, that the use of these kinds of machines are extending to different parts of the kingdom, under the auspices of the friends to humanity.

Improvements in the Clock and Watch-making line are said to have been the basis from which most of the improvements of our machinery in manufactures have originated; and the

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the British export trade of clocks and watches is of itself very considerable. Mr. Hardy's method of equalizing the long and short Arcs of Vibration in Time-keepers, Mr. S. Mendham's Watch Escapement, and Mr. Ward's Compensation Pendulum, will each be found to possess considerable merit.

For domestic uses, Mr. Collier's Portable Iron Stove for culinary purposes, or heating rooms, is safe, ingenious, and useful; and the new Air-tight Door-hinge, invented by Mr. Furness, will procure warmth and comfort, and probably prevent disease.

Mr. Stass's Machine for closing Boots in a standing Posture, will prevent the disorders to which men employed in such businesses are liable from the pressure upon the stomach when working in the old method.

Mr. Gilbert Gilpin's Method of raising Coals from Mines deserves particular notice in the present crisis of public affairs, as it not only supersedes the use of hempen ropes to a very extensive degree, but has been proved to be more safe, commodious, and to work with less friction, and at less expense.

The means of facilitating the carriage of minerals and heavy articles throughout the different parts of the kingdom, is an object

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object of importance, and Iron Rail-roads have been one of the advantageous plans, adopted on an extensive scale, for this purpose. Mr. Charles Le Caan's improvement of them is very ingenious and useful.

The repose of the night is frequently interrupted by the dread of housebreakers where a considerable property is at stake; the Door-pannels and Window-pannels, invented by Mr. Davis, will give a desirable security on such occasions.

Under the Class of Colonies and Trade, the Observations relative to the Encouragement of Herring Fisheries are very important. With a view to their extension, a translation of the Dutch placart or ordinance is inserted, to show the plan of their regulations for that fishery, styled by them *the principal mine and chief support of that country, and of the inhabitants therein.* A proper attention from the Government of our country would transfer this valuable mine from Holland, to become the property of our united empire.

From the East and West Indies the Society have received several curious and valuable seeds, and other articles. The account from Dr. Anderson of the flourishing state of the Royal Botanical Garden at St. Vincent, will be satisfactory to

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to all lovers of natural history, and probably tend to a connection and mutual supply of the plants in which either this country or that garden may be deficient.

Having thus taken a cursory view of the contents of the present volume, it may be necessary to add, that such further communications as will tend to improve and increase the Arts, Manufactures, and Commerce of the united empire, will ever meet with the attention of the Society, and the names of the inventors recorded in a manner honourable to themselves and beneficial to the public.

The Society, on the present occasion, express their thanks to the several public bodies and individuals from whom they have received the sundry presents noted in the present Volume.

Additions to the Library of the Society, by presents of books relative to the general subject of Arts, Manufactures, and Commerce, would be greatly conducive to the object of this institution.

The Society desire it to be clearly understood, that as a body they are not responsible for any opinion or representation of facts contained in the following pages. They have endeavoured only to compress, into a form more concise, such accounts as appeared to them too diffuse when received.

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The annexed extensive List of Members will best explain the present flourishing state of the Society; and the session now commenced is employed in the investigation of various new communications of importance to the best interests of the united empire.

Adelphi, London,
Dec. 31, 1807.

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PREMIUMS offered in 1807, *by the* SOCIETY *instituted at* London, *A.D.* 1754, *for the Encouragement of Arts, Manufactures, and Commerce.*

ADVERTISEMENT TO THE PUBLIC.

THE chief objects of the SOCIETY are to promote the Arts, Manufactures, and Commerce of this Kingdom, by giving honorary or pecuniary Rewards, as seem to them best adapted to the case, for all such useful Inventions, Discoveries, and Improvements, (though not mentioned in this book) as tend to that purpose; and, in pursuance of this plan, the SOCIETY have already expended many THOUSAND POUNDS, advanced by voluntary subscriptions of their members, and legacies bequeathed.

The Register of the Premiums and Bounties they have given, which may be seen at the SOCIETY'S HOUSE in the *Adelphi*, will show the very great advantages which the Public have derived from this Institution.

The meetings of the SOCIETY are held every *Wednesday*, at seven o'clock in the evening, from the fourth *Wednesday* in *October* to the first *Wednesday* in *June*. The several Committees meet on other evenings in the week during the session, as particularly mentioned in their printed book of Rules and Orders.

In order still farther to promote the laudable views of the SOCIETY, it may be necessary to explain the mode by which members are elected.

Each member has the privilege, at the meetings of the SOCIETY, or by letter to the Secretary, to propose any person who is desirous to become a member, provided the proposal contains the name, with the full addition, and place of abode, of the proposed member, and is signed by three members of the SOCIETY.

Peers of the Realm or Lords of Parliament are, on their being proposed, immediately ballotted for; the names of other persons proposed to become members are to be delivered to the Secretary, read at the next meeting of the SOCIETY, and then inserted in lists which are hung up in the Society's room: they are ballotted for at the second following ordinary meeting. In both cases, if two-thirds of the members then voting ballot in their favour, they are deemed perpetual members, upon payment of not less than Twenty Guineas in one sum, or subscribing members, upon payment of any sum not less than Two Guineas annually.

All members are entitled to vote and assist in all the business of the SOCIETY and the several Committees. The members have also the privilege of recommending two persons as Auditors at the meetings of the SOCIETY, and by addressing a note to the housekeeper, of introducing their friends to examine the various Models, Machines, and Productions, in different branches of Arts, Manufactures, and Commerce, for which rewards have been bestowed; also to inspect the magnificent series of moral and historical Paintings, executed by the late J. BARRY, Esq. which, with some valuable Busts, Statues, &c. decorate the Great Room.

Members have the use of the Society's Library, which is valuable, and annually increasing, from donations of scientific and useful books and engravings. The SOCIETY are highly sensible of the great importance of such acquisitions, and are happy to record them, with the names of the donors, in the Volume annually published of the SOCIETY'S Transactions, to which the members are entitled.

Ladies are eligible, as members of the SOCIETY, to all the privileges thereof, and are alone entitled to vote by proxy at elections, through the medium of any gentleman who is a member, on his producing a written authority for the same.

The time appointed for admission to the Paintings or Models, is from ten to two o'clock, Sundays and Wednesdays excepted.

ORDERED, SOCIETY'S HOUSE, ADELPHI, JUNE 1st, 1807.

That the several Candidates and Claimants, to whom the Society shall adjudge Premiums or Bounties, do attend at the Society's House, in the Adelphi, on the last Tuesday in May, 1808, *at Eleven in the Morning precisely, to receive the same; that day being appointed by the Society for the Distribution of their Rewards: And before that time no Premium or Bounty will be delivered, excepting to those who are about to leave the Kingdom.*

In cases where the Society may think fit to admit excuses for not attending in person, Deputies may be substituted to receive the Rewards, provided such Deputies are either Members of the Society, or superior Officers thereof.

C. WHITTINGHAM, Printer, 103, Goswell Street.

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PREMIUMS IN AGRICULTURE.

Article 1. ACORNS.

FOR having set, between the first of October, 1805, and the first of April, 1806, the greatest quantity of land, not less than ten acres, with acorns, with or without seeds, cuttings, or plants of other trees, at the option of the candidate; and for effectually fencing and preserving the same, in order to raise timber; the gold medal.

2. For the second greatest quantity of land, not less than five acres, set agreeably to the above conditions; the silver medal.

Certificates of setting agreeably to the above conditions, and that there are not fewer than three hundred young oaks on each acre, to be delivered to the Society on or before the first Tuesday in December, 1807.

3. RAISING OAKS. To the person who shall have raised, since the year 1803, the greatest number of oaks, not fewer than five thousand, either from young plants or acorns, in order to secure a succession of oak timber in this kingdom; the gold medal.

4. For the next greatest number, not fewer than three thousand; the silver medal.

Certificates that there were on the land, at least the number of young oak-trees required, in a thriving condition, two years after the planting, with an account of the methods pursued in making and managing the plantation, to be produced to the Society on or before the first Tuesday in January, 1808.

5. ASCERTAINING THE BEST METHOD OF RAISING OAKS. To the person who shall ascertain in the best manner, by actual experiments, the comparative merits of the different modes of raising oaks for timber, either from acorns set on land properly dug or tilled, from acorns set by the spade or dibble, without digging or tillage, either on a smooth surface, or among bushes, fern, or other cover; or from young plants, previously raised in nurseries, and transplanted; regard being had to the expense, growth, and other respective advantages of the several methods; the gold medal.

The *accounts*, and proper *certificates*, that not less than one acre has been cultivated in each mode, to be produced to the Society on or before the first Tuesday in November, 1807.

6. CHESNUTS. For having sown or set, between the first of October, 1805, and the first of April, 1806, the greatest quantity of land, not less than six acres, with Spanish chesnuts, with or without seeds, cuttings, or plants of other trees, adapted to such soil, at the option of the candidate; and for effectually fencing and preserving the same, in order to raise timber; the gold medal.

7. For the second greatest quantity, not less than four acres; the silver medal.

Certificates of sowing or setting, agreeably to the above conditions, and that there are not fewer than three hundred chesnut plants, in a thriving state, on each acre, to be delivered to the Society on or before the first Tuesday in January, 1808.

8. ELM. For having planted the greatest number of the English elm, not less than eight thousand, between the twenty-fourth of June, 1805, and the twenty-fourth of June, 1806; and for having effectually fenced and preserved the same in order to raise timber; the gold medal.

9. For the second greatest number, not less than five thousand; the silver medal.

Certificates of having planted agreeably to the above conditions, that the plants were in a healthy and thriving state two years at least after making the plantation, and specifying the distance of the plants, to be delivered to the Society on or before the first Tuesday in April, 1808.

10. LARCH. For having planted out, between the twenty-fourth of June, 1804, and the twenty-fourth of June, 1805, the greatest number of larch-trees, not fewer than five thousand, and for having effectually fenced and preserved the same, in order to raise timber; the gold medal.

11. For the next greatest number, not fewer than three thousand; the silver medal.

Certificates of the number of plants, that they were in a healthy and thriving state two years at least after they were planted out, with a general account of the methods used in making the plantation, to be delivered to the Society on or before the last Tuesday in December, 1807.

N. B. The larch-trees may be planted, either mixed with other trees, or by themselves, as may best suit the convenience of the planter.

12. ASH. For having sown or set, in the year 1804, the greatest quantity of land, not less than six acres, with ash for timber, with or without seed, cuttings or plants, of such other trees as are adapted to the soil; the gold medal.

13. For the next greatest quantity, not less than four acres; the silver medal.

Certificates of the sowing or setting, agreeably to the above conditions, that there are not fewer than six hundred ash plants on each acre, in a thriving and healthy condition, two years at least after the sowing or setting, with a general account of the methods used in making the plantation; to be delivered to the Society on or before the last Tuesday in December, 1807.

N. B. *It is the intention of the Society, that such lands only as are not calculated for the*

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purposes of Husbandry, should be employed for the purposes specified in these advertisements.

14. FOREST-TREES. To the person who shall have enclosed and planted, or set, the greatest number of acres (not less than ten) of land, that is incapable of being ploughed, such as the borders of rivers, the sides of precipices, and any land that has too many rocks, or that is not calculated to repay the expense of tillage, owing to the surface being too hilly, mountainous, or otherwise unfit for tillage, with the best sorts of forest-trees, namely, oak, Spanish chesnuts, ash, elm, beech, alder, willow, larch, spruce, and silver fir, with or without screens of Scotch fir, adapted to the soil, and intended for timber-trees, between the first of October, 1804, and the first of April, 1805; the gold medal.

15. For the second greatest quantity of land, not less than seven acres; the silver medal.

A particular *account* of the methods used in making and managing the plantations, the nature of the soil, the probable number of each sort of plants, together with proper *certificates* that they were in a healthy and thriving state two years at least after making the plantation, to be delivered to the Society on or before the first Tuesday in December, 1807.

N. B. With the above-forest trees, the seeds, cuttings, or plants, of such other trees as are adapted to the soil, and proper for underwood, may or may not be intermixed.

The candidates for planting all kinds of trees are to produce certificates that the respective plantations are properly fenced and secured, and particularly to state the condition of the plants at the time of signing such certificates. Any information which the candidates for the foregoing premiums may choose to communicate, relative to the methods made use of in forming the plantations, or promoting the growth of the several trees, or any other observations that may have occurred on the subject, will be thankfully received.

16. SECURING PLANTATIONS OF TIMBER-TREES, AND HEDGE-ROWS. To the person who shall give to the Society the most satisfactory account, founded on experience, of the most effectual and least expensive method of securing young plantations of timber-trees, and hedge-rows, from hares and rabbits, as well as sheep and larger cattle, which at the same time shall be least subject to the depredations of wood-stealers; the silver medal.

The *accounts*, and *certificates* of the efficacy of the method, to be produced to the Society on or before the first Tuesday in December, 1807.

17. COMPARATIVE CULTURE OF WHEAT, BROAD-CAST, DRILLED, AND DIBBLED. For the best set of experiments, made on not less than twelve acres, four of which to be sown broad-cast, four drilled, and four dibbled, the two latter in equidistant rows, in order fully to ascertain which is the most advantageous mode of cultivating wheat; the gold medal.

It is required that every operation and expense of each mode of culture be fully described; and that proper *certificates* of the nature and condition of the land on which the experiments were made, together with an *account* of the produce of the corn, the weight per bushel, and also of the straw, be produced to the Society on or before the first Tuesday in February, 1808.

18. BEANS AND WHEAT. To the person who shall have dibbled or drilled between the 1st of December, 1806, and the 1st of April, 1807, the greatest quantity of land, not less than ten acres, with beans, in equidistant rows, and hoed the intervals twice or oftener, and shall have sown the same land with wheat in the autumn of the year 1807; the gold medal.

It is required that an *account* of the sort and quantity of beans, the time of dibbling or drilling, and of reaping or mowing them, the produce per acre thrashed, the expense of dibbling or drilling, hand or horse hoeing, the distance of the rows, and the quality of the soil, together with *certificates* of the number of acres, and that the land was afterwards actually sown with wheat, be produced on or before the second Tuesday in March, 1808.

19. BEANS. To the person who, in the year 1806, shall discover and cultivate, either by the drill or dibbling method, on not less than five acres, a species of horse-beans or tick-beans, that will ripen their seeds before the 21st of August; the silver medal.

It is required that a particular account of the bean, the cultivation, and the expense attending it, with proper *certificates* of the nature and condition of the land on which the experiments were made, together with an *account* of the produce, the weight per Winchester bushel, and a sample of not less than a peck, be produced to the Society on or before the first Tuesday in December, 1807. It is apprehended that, if a bean should be brought into cultivation with the habits of the hotspur, or other early peas, that it would, in a great measure, escape the danger arising from the collier-insect, or other insects, and allow more time for the farmers to till the land for the subsequent crop of wheat. The *accounts* and *certificates* to be delivered on or before the first Tuesday in December, 1807.

20. PARSNIPS. To the person who in the

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year 1807, shall cultivate the greatest quantity of land, not less than five acres, with parsnips, for the sole purpose of feeding cattle or sheep; the gold medal.

Certificates of the quantity of land so cultivated, with a particular *account* of the nature of the soil and weight of the produce on sixteen perches, and also of the condition of the cattle or sheep fed with the parsnips, and the advantages resulting from the practice, to be produced to the Society on or before the second Tuesday in February, 1808.

21. BUCK WHEAT. To the person who shall cultivate the greatest quantity of land with buck wheat, not less than thirty acres; the gold medal.

It is required that the time of sowing and reaping be noticed; also a particular *account* of the species, cultivation, and expense attending it, the manner of reaping it, thrashing it, and housing the grain; with proper *certificates* of the nature and condition of the land on which the experiments were made, and the name of the crop, if any, which the same land bore the preceding year, together with an *account* of the produce, and a sample of the seed, not less than a quart, be produced to the Society on or before the second Tuesday in January, 1808.

22. For the next greatest quantity, not less than fifteen acres, on similar conditions; the silver medal.

Information respecting its application to the feeding of cattle, hogs, and poultry, and other of its uses, is also desired. It is known to be particularly serviceable in furnishing honey to bees.

23. RAISING GRASS SEEDS. To the person who shall raise the greatest quantity of each of any of the following named grass seeds, viz.—Meadow fox-tail (alopecurus pratensis), sweet-scented vernal grass (anthoxanthum odoratum), Timothy grass, (phleum pratense), meadow fescue grass (festuca pratensis), smooth-stalked meadow grass (poa pretensis), rough-stalked meadow grass (poa trivialis); the silver medal.

It is required that *certificates* from persons who have viewed them in a proper state, to identify that they are one or other of the seeds above mentioned, indicating clearly the particular species, and noticing the quantity produced of such seeds, free from weeds or mixture of other grasses, together with proper samples of the seeds, be produced to the Society on or before the first day of February, 1808.

24. PRESERVING TURNIPS. To the person who shall discover to the Society the best and cheapest method of preserving turnips perfectly sound, and in every respect fit for the purpose of supporting and fattening sheep and neat cattle, during the months of February, March, and April; the gold medal.

It is required that a full and accurate *account* of the method employed, and the expense attending the process, together with *certificates* that the produce of four acres at the least have been preserved according to the method described, and applied to the feeding of sheep and neat cattle; that the whole were drawn out of the ground before the first day of February, in order to clear the greater part of it previous to its being prepared for corn, and to save the soil from being exhausted by the turnips; and also of the weight of an average sixteen perches of the crop; be produced to the Society on or before the first Tuesday in December, 1807.

25. For the next in quantity and merit, on not less than two acres; the silver medal.

26. PRESERVING CABBAGES. To the person who shall discover to the Society the best and cheapest method of preserving drum-headed cabbages perfectly sound, and in every respect fit for the purpose of supporting and fattening sheep and neat cattle during the months of February, March, and April; the gold medal.

27. For the next in quantity and merit, on not less than two acres; the silver medal.

Conditions the same as for preserving turnips, Art 24. And the *accounts* to be produced on or before the first Tuesday in December, 1807.

28. PRESERVING CARROTS, PARSNIPS, OR BEETS. To the person who shall discover to the Society the best and cheapest method of preserving carrots, parsnips, or beets, perfectly sound, and in every respect fit for the purpose of supporting horses, and fattening sheep and neat cattle, during the months of February, March, and April; the gold medal.

Conditions the same as for preserving turnips, Art. 24. And the *accounts* to be delivered in on or before the first Tuesday in December, 1807.

29. For the next in quantity and merit, on not less than two acres; the silver medal.

30. PRESERVING POTATOES. To the person who shall discover to the Society the best and cheapest method of preserving potatoes, two or more years, perfectly sound, without vegetating, and in every other respect fit for the purpose of sets and the use of the table, and, consequently of supporting and fattening cattle; the gold medal, or thirty guineas.

It is required, that a full and accurate *account* of the method employed, and the expense attending the process, with *certificates* that one hundred bushels at the least have been preserved according to the method de-

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scribed, and that one or more bushels of the same potatoes have been set, and produced a crop without any apparent diminution of their vegetative power, and also that they have been used at table, with entire satisfaction to the person who eat of them, together with a sample of one bushel, be sent to the Society on or before the first Tuesday in December, 1807.

31. For the next greatest quantity, not less than fifty bushels; the silver medal.

32. MAKING MEADOW-HAY IN WET WEATHER. To the person who shall discover to the Society the best and cheapest method, superior to any hitherto practised, of making meadow-hay in wet weather; the gold medal.

A full *account* of the method employed, and of the expense attending the process, with not less than fifty-six pounds of the hay; and *certificates* that at least the produce of six acres of land has been made according to the method described, and that the whole is of equal quality with the sample; to be produced on or before the first Tuesday in January, 1808.

33. HARVESTING CORN IN WET WEATHER. To the person who shall discover to the Society the best and cheapest method, superior to any hitherto practised, of harvesting corn in wet weather; the gold medal.

A full *account* of the method employed, and of the expense attending the process, with not less than two sheaves of the corn, and *certificates* that at least the produce of ten acres has been harvested according to the method described, and that the whole is of equal quality with the samples, to be produced on or before the first Tuesday in January, 1808.

34. GAINING LAND FROM THE SEA. To the person who shall produce to the Society an account, verified by actual experiment, of his having gained the greatest quantity of land from the sea, not less than fifty acres, on the coast of Great Britain or Ireland; the gold medal.

Certificates of the quantity of land, and that the experiments were begun after the first of January, 1801, to be produced to the Society on or before the last Tuesday in November, 1807.

35. The same premium is extended one year farther.

Certificates to be produced on or before the last Tuesday in November, 1808.

36. IMPROVING LAND LYING WASTE. For the most satisfactory *account* of the best method of improving any of the following soils, being land lying waste or uncultivated, *viz.* clay, gravel, sand, chalk, peat-earth and bog, verified by experiments on not less than fifty acres of land; the gold medal.

37. For the next greatest quantity, not less than thirty acres; the silver medal.

It is required, that the land, before such improvement, be absolutely uncultivated, and in a great measure useless, and that, in its improved state, it be enclosed, cultivated, and divided into closes.

Certificates of the number of acres, of the quality of the land so improved, with a full *account* of every operation and expense attending such improvement, the state it is in as to the proportion of grass to arable, and the average value thereof, to be produced on or before the first Tuesday in February, 1808.

38. MANURES. For the most satisfactory set of experiments, to ascertain the comparative advantages of the following manures, used as top-dressings on grass and corn land, *viz.* soot, coal-ashes, wood-ashes, lime, gypsum, night soil, or any other fit article; the gold medal. It is required that the above experiments be made between two or more of the above-mentioned manures, and that no less than two acres of land be dressed with each manure.

An *account* of the nature of the soil, quantity, and expense of the manure and crops, with *certificates*, to be produced on or before the last Tuesday in February, 1808.

39. RAISING WATER FOR THE IRRIGATION OF LAND. To the person who shall discover to the Society the cheapest and most effectual method of raising water in quantities sufficient to be beneficially employed for the purpose of irrigating land, superior to, and cheaper than any other method now in use; the gold medal, or fifty guineas.

A model, on a scale of one inch to a foot, with *certificates* that a machine at large, on the same construction, has been used, specifying the quantity of water delivered in gallons per hour, and the height to which it was raised, to be produced to the Society on or before the first of March, 1808.

40. PARING PLOUGH. To the person who shall invent and produce to the Society, a machine or plough for the purpose of paring land preparatory to burning, superior to any hitherto known, or in use for such purpose, and to be worked by not more than one man and two horses; the silver medal, or twenty guineas.

The machine, and *certificates* that at least three acres have been pared by it in a proper manner, to be produced to the Society on or before the first of January, 1808.

41. MACHINE FOR DIBBLING WHEAT. To the person who shall invent a machine, superior to any hitherto known or in use, to answer the purpose of dibbling wheat, by

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which the holes for receiving the grain may be made at equal distances and proper depths; the silver medal and ten guineas.

The *machine*, with *certificates* that at least three acres have been dibbled by it, to be produced to the Society on or before the second Tuesday in January, 1808.

42. MACHINE FOR REAPING OR MOWING CORN. For inventing a machine to answer the purpose of mowing or reaping wheat, rye, barley, oats, or beans, by which it may be done more expeditiously and cheaper than by any method now practised, provided it does not shed the corn or pulse more than the methods in common practice, and that it lays the straw in such a manner that it may be easily gathered up for binding; the gold medal.

The *machine*, with *certificates* that at least three acres have been cut by it, to be produced to the Society on or before the second Tuesday in December, 1807. Simplicity and cheapness in the construction of this and the preceding machine, will be considered as principal parts of their merit.

43. THRASHING MACHINE. To the person who shall invent a machine by which corn of all sorts may be thrashed more expeditiously, effectually, and at a less expense, than by any method now in use; the gold medal.

The *machine*, or a model, with proper *certificates* that such a machine has been usefully applied, that at least thirty quarters have been thrashed by it, and of the time employed in the operation, to be produced to the Society on or before the last Tuesday in February, 1808.

44. DESTROYING THE GRUB OF THE COCKCHAFER. To the person who shall discover to the Society an effectual method, verified by repeated and satisfactory trials, of destroying the grub of the cockchafer, or of preventing or checking the destructive effects which always attend corn, peas, beans, and turnips, when attacked by those insects; the gold medal.

The *accounts*, with proper *certificates*, to be produced on or before the first Tuesday in January, 1808.

45. DESTROYING WORMS. To the person who shall discover to the Society an effectual method, verified by repeated and satisfactory trials, of destroying worms, or of preventing the destructive effects they occasion on corn, beans, pease, or other pulse; the silver medal.

The *accounts*, with proper *certificates*, to be produced to the Society on or before the first Tuesday in January, 1808.

46. DESTROYING THE FLY ON HOPS. To the person who shall discover to the Society an easy and efficacious method of destroying the fly on hops, superior to any hitherto known or practised, on not less than four acres of hop ground; the gold medal.

Accounts and *certificates* to be delivered to the Society on or before the first Tuesday in February, 1808.

47. PREVENTING THE BLIGHT, OR RAVAGES OF INSECTS, ON FRUIT-TREES AND CULINARY PLANTS. To the person who shall discover to the Society the most effectual method of preventing the blight or ravages of insects on fruit-trees and culinary plants, superior to any hitherto known or practised, and verified by actual and comparative experiments; the silver medal.

The *accounts*, with proper *certificates*, to be delivered to the Society on or before the second Tuesday in December, 1807.

48. CURE OF THE ROT IN SHEEP. To the person who shall discover to the Society the best and most effectual method of curing the rot in sheep, verified by repeated and satisfactory experiments; the gold medal.

It is expected that the candidates furnish accurate *accounts* of the symptoms and cure of the disease, together with the imputed cause thereof, and the actual or probable means of prevention, which, with proper *certificates*, must be delivered to the Society on or before the first Tuesday in February, 1808.

49. CURE OF THE FOOT-ROT IN SHEEP. To the person who shall discover to the Society the best and most effectual method of curing the foot-rot in sheep; the silver medal.

It is required that the cure be ascertained by repeated and satisfactory experiments, and the method of performing it be verified by proper *certificates* delivered to the Society on or before the first Tuesday in February, 1808.

50. PREVENTING THE ILL EFFECTS OF FLIES ON SHEEP. To the person who shall discover to the Society the most effectual method of protecting sheep from being disturbed and injured by flies; the silver medal.

It is required, that the method be ascertained by repeated experiments, and that a *certificate* of its efficacy be delivered to the Society on or before the first Tuesday in December, 1807.

51. PROTECTING SHEEP. To the person who, in the year 1806, shall protect the greatest number of sheep, not fewer than one hundred, by hovels, sheds, or any other means, and give the most satisfactory account, verified by experiment, of the advantages arising from the practice of protecting sheep from the inclemency of the weather, by hovels, sheds, or any other means; the gold medal.

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A particular *account* of the experiments made, with the advantages arising therefrom, together with the expense, and *certificates* of its utility, to be produced to the Society on or before the first Tuesday in March, 1808.

N. B. It is required that the *certificates* shall specify the length of time the sheep were so protected, and the manner in which they were maintained during that time; together with the general method of managing them.

52. CULTURE OF HEMP IN CERTAIN PARTS OF SCOTLAND. The Society wishing to encourage the growth of hemp for the use of the navy in certain parts of Scotland, comprehending the whole county of Argyle, that part of Perthshire, situated to the north of the river Tay, and west of the Military Road (see Ainsley's Map of Scotland) leading from Logierait to the county of Inverness, and such other parts of Scotland as lie north of Inverness-shire, offers to the person who shall sow with hemp, in drills at least eighteen inches asunder, the greatest quantity of land in the above-mentioned district, not less than fifty acres statute measure, in the year 1807, and shall at the proper season cause to be plucked the summer hemp, (or male hemp bearing no seed) and continue the winter hemp (or female hemp bearing seed) on the ground until the seed is ripe; the gold medal.

53. To the person who shall sow with hemp, in drills at least eighteen inches asunder, the next greatest quantity of land in the above-mentioned district, not less than twenty-five acres, statute measure, in the year 1807, and shall at the proper season cause the same to be plucked as above-mentioned; the silver medal.

Certificates of the number of acres, of the distance of the drills, of the plucking of the hemp, with a general *account* of the soil, cultivation, and produce, to be delivered to the Society, along with fourteen pounds of the hemp and two quarts of the seed, on or before the second Tuesday in January, 1808.

PREMIUMS FOR DISCOVERIES AND IMPROVEMENTS IN CHEMISTRY, DYEING, AND MINERALOGY.

54. PRESERVING SEEDS OF VEGETABLES. For the best method of preserving the seeds of plants in a state fit for vegetation a longer time than has hitherto been practised, such method being superior to any known to the public, and verified by sufficient trial, to be communicated to the Society on or before the first Tuesday in December, 1807; the gold medal, or thirty guineas.

55. PREVENTING THE DRY-ROT IN TIMBER. To the person who shall discover to the Society the cause of the dry-rot in timber, and disclose a certain method of prevention superior to any hitherto known; the gold medal, or thirty guineas.

The *accounts* of the cause, and method of prevention, confirmed by repeated experiments, to be produced to the Society on or before the second Tuesday in December, 1807.

56. PRESERVING SALTED PROVISIONS FROM BECOMING RANCID OR RUSTY. To the person who shall discover to the Society the best, cheapest, and most efficacious method of preserving salted provisions from growing rancid or rusty; the gold medal, or thirty guineas.

A full *description* of the method, with proper *certificates* that it has been found, on repeated trials, to answer the purpose intended, to be produced to the Society on or before the first Tuesday in February, 1808.

57. REFINING WHALE OR SEAL OIL. For disclosing to the Society an effectual method of purifying whale or seal oil from the glutinous matter that incrusts the wicks of lamps, and extinguishes the light, though fully supplied with oil; the gold medal, or fifty guineas.

It is required that the whole of the process be fully and fairly disclosed, in order that satisfactory experiments may be made by the Society to determine the validity of the claim; and *certificates* that not less than twenty gallons have been purified according to the process delivered in, together with two gallons of the oil, in its unpurified state, and two gallons so refined, to be produced to the Society, on or before the Second Tuesday in February, 1808.

58. MANUFACTURING TALLOW CANDLES. To the person who shall discover to the Society a method of hardening or otherwise preparing tallow, so that candles may be made of it which will burn as clear and with as small a wick as wax candles, without running, and may be afforded at a less expense than any at present made with spermaceti; the gold medal, or thirty guineas.

Certificates that 112lb. of such tallow have been made into candles, and 12lb. of the candles made thereof, to be produced to the Society on or before the second Tuesday in January, 1808.

59. CANDLES FROM RESIN OR OTHER SUBSTANCES. To the person who shall discover to the Society the best method of making candles of resin, or any other substance, fit for common use, at a price much inferior to those made of tallow only; the gold medal, or thirty guineas.

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Six pounds at least of the candles so prepared, with an *account* of the process, to be delivered to the Society on or before the first Tuesday in December, 1807.

60. METHOD OF SEPARATING SUGAR IN A SOLID FORM FROM TREACLE. To the person who shall discover to the Society the best method of separating sugar from treacle, in a solid form, at such an expense as will render it advantageous to the public; the gold medal, or fifty guineas.

A quantity of the sugar so prepared, in a solid form, not less than thirty pounds weight, with an *account* of the process, and *certificates* that not less than one hundred weight has been prepared, to be produced to the Society on or before the first Tuesday in February, 1808.

61. INCREASING STEAM. To the person who shall invent and discover to the Society a method, verified by actual experiments, of increasing the quantity or force of steam, in steam-engines, with less fuel than has hitherto been employed, provided that in general the whole amount of the expenses in using steam-engines may be considerably lessened; the gold medal, or thirty guineas.

To be communicated to the Society on or before the first Tuesday in January, 1808.

62. SUBSTITUTE FOR TAR. To the person who shall invent and discover to the Society the best substitute for Stockholm tar, equal in all its properties to the best of that kind, and prepared from materials the produce of Great Britain; the gold medal, or one hundred guineas. A quantity of the substitute, not less than one hundred weight, with *certificates* that at least one ton has been manufactured, and that it can be afforded at a price not exceeding that of the best foreign tar, together with an *account* of the process, to be delivered to the Society on or before the first Tuesday in March, 1808.

63. PREPARATION OF TAN. To the person who shall prepare, in the most concentrated form, so as to be easily portable, and at a price applicable to the purposes of manufacturers, the largest quantity, not less than one hundred weight, of the principle called by the French *tannin*, which abounds in oak-bark and many other vegetable substances; the gold medal, or thirty guineas.

Certificates of the superior quality of the quantity so prepared, and a sample of not less than 28lb. to be produced to the Society on or before the last Tuesday in January, 1808.

64. INDELIBLE INK. To the person who shall discover to the Society a method of making a black ink proper for writing, superior to any at present known, indestructible by chemical applications, and not dearer than that which is now in common use; the silver medal, or fifteen guineas.

Certificates that not less than two gallons of such ink have been actually prepared, and found to possess the qualities above mentioned, with a full detail of the process of making it, and two quarts of the ink, to be delivered to the Society on or before the second Tuesday in January, 1808.

65. PREPARATION OF A RED STAIN FOR COTTON CLOTH. To the person who shall communicate to the Society the cheapest and most effectual method of printing or staining cotton cloths with a red colour, by an immediate application of the colouring matter to the cloth, equally beautiful and durable with the red colours now generally procured from decoctions of madder; the gold medal, or thirty guineas.

Certificates that the above process has been advantageously used on ten pieces of calico, each twenty-one yards or upwards in length; one piece of the calico so printed, a quart of the colour in a liquid state, and a full *account* of the preparation and application, to be produced to the Society on or before the second Tuesday in January, 1808.

66. PREPARATION OF A GREEN COLOUR FOR PAINTING COTTON CLOTH. To the person who shall communicate to the Society the best and cheapest method of printing with a full green colour on cotton cloth, by an immediate application of the colouring matter from a wooden block to the cloth, equally beautiful and durable as the colours now formed from the complicated process of the decoction of weld on alumine, and the solutions of indigo by earths or alkaline salts; the gold medal, or thirty guineas.

Certificates and conditions as for premium 65.

67. RENDERING MUSLIN LESS COMBUSTIBLE. To the person who shall discover to the Society a method of rendering muslin less combustible, to be effected by a cheaper and more effectual mode than any hitherto known; the silver medal.

Specimens of the muslin so prepared, with a full account of the process employed for the purpose, to be produced to the Society on or before the first Tuesday in February, 1808.

N. B. It is expected that the means employed should neither injure the quality, nor stain the muslin, nor damage any print or dye with which it may be coloured.

68. SUBSTANCE FOR THE BASIS OF PAINT. To the person who shall produce to the Society the best substitute, superior to any hitherto known, for the basis of paint, equally proper for the purpose as the white-lead now employed; such substitute not to be of a

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noxious quality, and to be afforded at a price not materially higher than that of white-lead; the gold medal, or one hundred guineas.

A quantity of the substitute, not less than 50lb. weight, with an *account* of the process used in preparing it, and *certificates* that at least one hundred weight has been manufactured, to be produced to the Society on or before the first Tuesday in January, 1808.

69. RED PIGMENT. To the person who shall discover to the Society a full and satisfactory process for preparing a red pigment, fit for use in oil and water, equal in tone and brilliancy to the best carmines and lakes now known or in use, and perfectly durable; the gold medal, or thirty guineas.

One pound weight of such colour, and a full disclosure of its preparation, to be produced to the society on or before the first Tuesday in February, 1808.

N. B. It is not required that the colour should resist the action of fire or chemical applications, but remain unaltered by the common exposure to strong light, damps, and noisome vapours.

70. ULTRAMARINE. To the person who shall prepare an artificial Ultramarine, equal in colour, brilliancy, or durability, to the best prepared from lapis lazuli, and which may be afforded at a cheap rate; the gold medal, or thirty guineas.

The conditions are the same as in the preceding premium for the red pigment.

71. BLUE PIGMENT FROM IRON. To the person who shall invent, and discover to the Society, the best blue pigment from iron, superior to Antwerp or Prussian blue in colour and durability, fit for use in oil or water, which may be afforded at a cheap rate; the gold medal, or thirty guineas.

One pound weight of the colour, and a full disclosure of its preparation, to be produced to the Society on or before the first Tuesday in February, 1808.

N. B. It appears from the analysis of lapis lazuli by Klaproth, and the experiments of Guyton, (related in the Annales de Chemie) that ultramarine is a blue sulphurat of iron, and that a blue substance much resembling it is constantly found amongst the scoriæ of blast furnaces where iron is reduced, the Society by offering the above premium wishes to call the attention of persons to these facts, and encourage them to make experiments, in the hope of producing a blue pigment which may be substituted for ultramarine.

72. DESTRUCTIVE EFFECTS FROM MOTHS. To the person who shall discover to the Society a cheap, easy, and effectual method, verified by repeated and satisfactory trials, of preventing the destructive effects occasioned by moths and other insects, in furs, woollens, and other articles, superior to any hitherto known or practised, the silver medal; or fifteen guineas.

The *accounts*, with proper *certificates*, to be produced to the Society on or before the first Tuesday in January, 1808.

73. STATUARY MARBLE. To the person who shall discover, within Great Britain or Ireland, a quarry of white marble fit for the purposes of statuary, and equal in all respects to those kinds now imported from Italy; the gold medal, or one hundred pounds.

A block of at least three feet in length, two in height, and two in width, with an account of the situation of the quarry, and *certificates* of its possessing considerable extent, to be produced to the Society on or before the first Tuesday in February, 1808.

N. B. In order to prevent useless expense or trouble to the claimant in forwarding so large a block, the Society will be ready to examine any smaller specimen of the marble, and express their opinion of its value to the candidate before the block required by the above premium is produced.

74. PREPARATION OF SULPHURIC ACID FROM SULPHUR WITHOUT THE USE OF ANY NITRIC SALT. To the person who shall prepare the largest quantity (not less than one ton) of sulphuric acid from sulphur, without any nitric salt, of a specific gravity, not inferior to the best sulphuric acid of commerce; the gold medal, or fifty guineas.

Certificates that not less than the above quantity of such an acid has been prepared, together with a sample, to be produced to the Society on or before the first Tuesday in January, 1808.

75. PREPARATION OF ANY ALKALINE OR EARTHEN NITRATE. To the person who shall prepare, in Great Britain, the largest quantity, not less than one hundred weight, of any salt of nitric acid, with either earths or alkalis, by a method superior to, and as cheap as those hitherto practised; the gold medal, or one hundred guineas.

Certificates of the above quantity having been prepared, and a sample of not less than 28lb. to be produced to the Society on or before the last Tuesday in January, 1808.

76. FINE BAR-IRON. To the person, in Great Britain, who shall make the greatest quantity of bar-iron, not less than ten tons, with coak, from coak pigs, equal in quality to the best iron imported from Sweden or Russia, and as fit for being converted into steel; the gold medal, or fifty guineas.

Samples, not less than one hundred weight, with *certificates* that the whole quantity is of equal quality, to be produced to the Society on or before the first Tuesday in January, 1808.

77. PRESERVING IRON FROM RUST. To

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the person who shall invent and discover to the Society a cheap composition, superior to any now in use, which shall effectually preserve wrought iron from rust; the gold medal, or fifty guineas.

A full description of the method of preparing the composition, with *certificates* that it has stood at least two years unimpaired, being exposed to the atmosphere during the whole time, to be produced to the Society, with ten pounds weight of the composition, on or before the first Tuesday in January, 1808.

78. REFINING BLOCK-TIN. To the person who shall discover to the Society the best method of purifying or refining block-tin, so as to render it fit for the finest purposes to which grain-tin is now applied, and not higher in price; the gold medal, or fifty guineas.

Certificates, that not less than three tons have been so refined or purified, with a full detail of the process, and a quantity, not less than one hundred weight, of the tin so refined, to be produced to the Society on or before the first Tuesday in January, 1808.

79. GLAZING EARTHEN-WARE WITHOUT LEAD. To the person who shall discover to the Society the cheapest, safest, most durable, and most easily fusible composition, fit for the purpose of glazing the ordinary kinds of earthen-ware, without any preparation of lead, and superior to any hitherto in use; the gold medal, or thirty guineas.

Specimens of the ware so glazed, with proper *certificates* of its having succeeded, and a sample of the materials made use of, to be produced to the Society on or before the first Tuesday in February, 1808.

80. REFINING COPRER FROM THE ORE. To the person who shall discover to the Society the best method of separating, purifying, and refining copper from the ore, so as to render it fit for the finest purposes to which fine copper is now applied, and by a process superior to any hitherto known or in use, and not higher in price; the gold medal, or fifty guineas.

Certificates, that not less than three tons have been so prepared or refined, and a quantity not less than one hundred weight of the copper so refined, to be produced to the Society on or before the first Tuesday in February, 1808.

81. MINERALOGICAL MAP OF ENGLAND AND WALES. To the person who shall complete and publish an accurate mineralogical map of England and Wales, on a scale of not less than ten miles to an inch, containing an account of the situation of the different mines therein, and describing the kinds of minerals thence produced; the gold medal, or fifty guineas.

Certificates of the accuracy of such map, together with the map, to be produced to the Society on or before the first Tuesday in February, 1808. The map to remain the property of the Society.

82. MINERALOGICAL MAP OF IRELAND. The same premium is offered for a mineralogical map of Ireland, on similar conditions.

83. MINERALOGICAL MAP OF SCOTLAND. The same premium is offered for a mineralogical map of Scotland, on similar conditions.

84. NATURAL HISTORY. To the author who shall publish, in the year 1807, the natural history of any county in England or Wales; the gold medal, or fifty guineas.

It is required that the several natural productions, whether animal, or vegetable, or mineral, peculiar to the county, or found therein, be carefully and specifically arranged and described, in order that the public may be enabled to judge what arts or manufactures are most likely to succeed in such county. The work to be delivered to the Society on or before the last Tuesday in January, 1808.

PREMIUMS IN POLITE ARTS.

85. HONORARY PREMIUMS FOR DRAWING, BY NOBILITY. For the best original drawing of any kind, by young gentlemen under the age of twenty-one, sons or grandsons of peers or peeresses in their own right, of Great Britain or Ireland; the honorary medal of the Society in gold.

86. The silver medal for the best copy.

87—88. The same premiums will be given, on the like conditions, to young ladies, daughters or grand-daughters of peers or peeresses in their own right, of Great Britain or Ireland.

89. HONORARY PREMIUMS FOR DRAWING, BY GENTLEMEN. For the best original drawing, of any kind, by young gentlemen under the age of twenty-one; the gold medal.

90. For the best copy, the silver medal.

91—92. The same premiums will be given for drawings by young ladies.

N. B. As the foregoing honorary premiums are intended only for such of the nobility and gentry as may hereafter become patrons or patronesses of the arts; persons professing any branch of the polite arts, or any business dependent on the arts of design, or the sons or daughters of such persons, will not be admitted candidates in these classes.

93. PREMIUMS FOR DRAWINGS IN GENERAL. For the best original drawing of any kind, by persons of either sex, under the age of twenty-one; the gold medal.

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94. For the best copy; the silver medal.

95. HISTORICAL DRAWINGS. For the best historical drawing, being an original composition of three or more human figures, the height of the principal figure not less than eight inches, by persons of either sex under twenty-one years of age; the gold medal.

96. For the next in merit; the silver medal.

97. DRAWINGS OF OUTLINES. For the best outline, after the plaster cast, of any antique statue, by persons of either sex under the age of twenty-one, the figure not less than eighteen inches; the silver medal.

98. PAINTINGS IN OIL. For the best painting in oil, of a landscape after nature, the size thirty-six by twenty-eight inches, by persons of either sex under twenty-five years of age; the gold medal.

99. For the next in merit, the silver medal. Each candidate must mention from whence the view was taken.

100. DRAWING OF LANDSCAPES. For the best drawing, in water-colours, of a landscape after nature, not less than eighteen inches by twelve, by persons of either sex under twenty-one years of age; the silver medal.

101. DRAWINGS BY ENGRAVERS' PUPILS. For the best finished drawing of the fighting Gladiator, from a cast the size of the original marble, the size of the drawing not less than eighteen inches, by persons under twenty-one years of age; the silver medal.

102. ENGRAVING OF PORTRAITS. To the person who shall complete the best portrait engraved in the line manner; the gold medal.

It is required, that two impressions of the engraving be produced, and to remain the property of the Society.

103. For the next in merit; the silver medal, on similar conditions.

104. LINE ENGRAVINGS OF HISTORICAL SUBJECTS. For the best historical engraving of any size; the gold medal.

105. For the next in merit; the silver medal.

106. LINE ENGRAVINGS OF LANDSCAPES. For the best line engraving of a landscape, the gold medal.

107. For the next in merit; the silver medal.

N. B. It is not necessary, in the classes of line engravings, for the artist's name to be concealed. The first aquafortis proof is required to be sent in with two finished impressions. The aquafortis proof, and the two impressions, to remain the property of the Society.

108. PERSPECTIVE DRAWINGS OF MACHINES. For the best perspective drawings of machines, by persons under twenty-one years of age; the silver medal.

109. ENGRAVING ON WOOD OR METAL BLOCKS, &c. For the best engraving on wood or metal blocks, after the manner of Albert Durer or Holbein's Dance of Death, of an historical subject; the size of the principal figure not less than six inches in height, and the block to be at least twelve inches by nine; the gold medal.

Two or more impressions, with the block, to be produced to the Society. The impressions, but not the block, to remain the property of the Society.

110. For the next in merit; the silver medal, on similar conditions.

111. BRONZES. For the best drapery figure or group cast in bronze; if a single figure, not less than twelve inches high; and if a group, not less than nine inches; and which will require the least additional labour to repair; the gold medal, or the silver medal and twenty guineas.

The cast to be exhibited to the Society before it is begun to be repaired, with the original figure or group, together with a full explanation of the whole process.

112. MEDAL DIE ENGRAVING. For the best die engraving of one or more heads after the engraver's own model; the gold medal.

113. For the next in merit, the silver medal.

114. For the best die engraving of one figure, or a group consisting of not more than three figures, after the engraver's own model; the gold medal.

115. For the next in merit; the silver medal.

The dies, and two impressions or casts, and the model, in each claim for medal die sinking, to be produced to the Society. The impressions or casts, but not the model or die, to remain the property of the Society.

116. ARCHITECTURAL DESIGNS. For the best original design of a proper repository for the Society's models, consisting of plan, elevation, and section, the design not to exceed forty-five squares of building on the ground plan; the gold medallion. The drawing to remain the property of the Society.

For the next in merit; the silver medallion, on similar conditions.

The following inscription to be engraved on these medallions: *The Premium given by the Society for the Encouragement of Arts, Manufactures, and Commerce, in conformity to the Will of John Stock, of Hampstead, Esq.*

CONDITIONS
FOR THE POLITE ARTS.

All the claims under this class are to be produced to the Society on or before the last Tuesday in February, 1808; and no other ar-

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ticles in the class of Polite Arts to be admitted into the Society with a view to bounties after the last Tuesday in March.

No person who has gained the first premium in any class shall be admitted a candidate in a class of an inferior age; and no candidate shall receive more than one premium in one year.

No person shall be admitted a candidate in any class, who has already obtained the first premium in that class.

No more than one performance in any class shall be received from the same candidate.

All performances (to which premiums or bounties are adjudged) shall remain with the Society till after the first Wednesday in June, when they will be re-delivered, unless mentioned in the Premiums to the contrary.

No performance shall be admitted, that has obtained a premium, reward, or gratification, from any other society, or academy, or been offered for that purpose.

All performances that obtain premiums in the Polite Arts must have been begun after the publication of such premiums, except line engravings.

It is required, that the matters for which premiums are offered, be delivered in without names, or any intimation to whom they belong; that each particular thing be marked in what manner each claimant thinks fit, such claimant sending with it a paper sealed up, having on the outside a corresponding mark, and on the inside the claimant's name, residence, and age; which paper is not to be opened unless the candidate be successful, or by a special vote of the Society.

To encourage real merit, and prevent attempts to impose on the Society, by producing drawings made or retouched by any other person than the candidate, the Society require a specimen of the abilities of each successful candidate, under the inspection of the Committee of Polite Arts, in every instance where such proof may appear necessary.

All candidates in the Polite Arts are required to signify, on their drawings, whether the performances are originals or copies; and if copies, whence they were taken.

PREMIUMS FOR ENCOURAGING AND IMPROVING MANUFACTURES.

117. CLOTH FROM HOP-STALKS, &c. To the person who shall produce to the Society the greatest quantity, not less than 30 yards of cloth, at least 27 inches wide, made in Great Britain or Ireland, of hop-stalks or bines, or other raw vegetable substances, the produce of Great Britain or Ireland, superior to any hitherto manufactured from such substances, and which can be generally afforded as cheap as cloth of equal quality and appearance now made from hemp, flax, or cotton, and much finer in quality than any hitherto manufactured in England from hop-stalks, &c. the gold medal, or thirty guineas.

One pound of the thread of which the cloth is made, and thirty yards of the cloth, together with proper *certificates* that the whole is manufactured from hop-stalks or bines, &c. to be produced to the Society on or before the first Tuesday in December, 1807.

N. B. The Society is already in the possession of cloth made in England from hop-stalks or bines, which may be inspected by application to the Housekeeper.

118. HOGS' BRISTLES. To the person who shall prepare the greatest quantity of bristles, from swine bred in the united kingdoms, equal in quality to those imported from Russia or Prussia, and at as cheap a rate; the silver medal, or fifteen guineas.

Certificates, that not less than one hundred weight have been so prepared, and a sample of not less than fourteen pounds of such bristles, to be produced to the Society on or before the last Tuesday in February, 1808.

119. WICKS FOR CANDLES OR LAMPS. To the person who shall discover to the Society a method of manufacturing hop-stalks or bines, or any other cheap material, the growth of Great Britain, so as to render them equally fit for the purpose of supplying the place of cotton, for wicks of candles or lamps; twenty guineas.

Samples, not less than five pounds weight, of the wick so prepared, to be produced to the Society on or before the last Tuesday in December, 1807, with *certificates* that the whole quantity is equal in quality to the sample.

120. EXPERIMENTS TO ASCERTAIN THE PROPER THICKNESS OF WICKS FOR CANDLES. To the person who shall make known to the Society the most satisfactory result of a series of experiments, actually made by him to determine the best thickness of cotton wicks for candles, so as to obviate the defects of those commonly used; the silver medal, or ten guineas.

Certificates, that not less than one hundred weight have been so made, and six pounds of the candles, to be produced to the Society on or before the last Tuesday in February, 1808.

N. B. The intention in offering this premium, is to ascertain the proper thickness or bulk of the wick in proportion to that of the

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tallow, and to remove the unpleasant consequences and waste arising from the sparkling, or guttering of the candles in common use.

121. PAPER FROM RAW VEGETABLE SUBSTANCES. To the person in Great Britain, or Ireland, who shall, between the first of January, 1087, and the first of January, 1808, make the greatest quantity, and of the best quality, (not less than ten reams) of good and useful paper, from raw vegetable substances, the produce of Great Britain or Ireland, of which one hundred weight has not been used in manufacturing paper previous to January, 1806, superior to any hitherto manufactured from such substances, and which can be generally afforded as cheap as paper of equal quality and appearance now made from rags; twenty guineas.

N. B. The object of the Society being to add to the number and quantity of raw materials used in this manufacture, it is their wish to include every useful sort of paper, and to introduce such natural products as can be easily and cheaply procured in great quantities. The Society are in possession of two volumes containing a great variety of specimens of paper made from raw vegetable substances, viz. nettles, potatoe-haulm, poplar, hop-bines, &c. which volumes may be inspected by any person on application to the Housekeeper.

Certificates of the making such paper, and one ream of the paper, to be produced on or before the second Tuesday in January, 1808.

122. TRANSPARENT PAPER. To the person who shall discover to the Society a method of making paper from the pulp, that shall be perfectly transparent, and of a substance and body equal to foolscap, that shall take and bear common writing ink with the same facility and correctness as writing-paper generally in use; the silver medal, or twenty guineas.

Certificates of the making such paper, an *account* of the process, and one ream of the paper, to be produced on or before the second Tuesday in January, 1808.

123. CHINTS PATTERNS FOR CALICO PRINTERS. For the best original pattern in a new taste, of light or dark-ground chintz for garment-work, or furniture, fit for the purposes of calico-printers, by persons of either sex; the gold medal. The pattern for which the premium is adjudged to remain the property of the Society.

124. For the next in merit; the silver medal, on similar conditions.

125. COPPER-PLATE PATTERNS FOR CALICO-PRINTERS. For the best pattern, in a new style, fit for the purposes of calico-printers for garment work, or furniture; the silver medal. The pattern for which the premium is adjudged to remain the property of the Society.

N. B. The patterns to be produced on or before the last Tuesday in February, 1808.

PREMIUMS IN MECHANICS.

126. GUNPOWDER-MILLS. To the person who, in the year 1807, shall invent and bring to perfection the most effectual method of so conducting the works of gunpowder-mills, in the business of making gunpowder, as to prevent explosion; the gold medal, or one hundred guineas.

Certificates and *accounts* of the method having been put in practice in one or more gunpowder-mills in this kingdom, and that it promises, in the opinion of the best judges concerned in such works, to answer the purpose intended, to be produced to the Society on or before the first Tuesday in February, 1808.

N. B. As an encouragement to persons to turn their thoughts to improvements of this nature, if any should be made on the present method of conducting the business of gunpowder making, which fall short of the total prevention of explosion, and they are sent to the Society for the sake of humanity, the papers so sent in will receive due consideration, and such bounty or reward will be bestowed as they may appear to merit.

127. TRANSIT INSTRUMENT. To the person who shall invent and produce to the Society a cheap and portable transit-instrument which may easily be converted into a zenith-sector, capable of being accurately and expeditiously adjusted for the purpose of finding the latitudes and longitudes of places, and superior to any portable transit-instrument now in use; the gold medal, or forty guineas.

To be produced on or before the last Tuesday in January, 1808.

128. TAKING WHALES BY THE GUN-HARPOON. To the person who, in the year 1807, shall strike the greatest number of whales, not fewer than three, with the gun-harpoon; ten guineas.

Certificates of the striking such whales, and that they were actually taken in the year 1807, signed by the master, or by the mate, when the claim is made by the master, to be produced to the Society on or before the last Tuesday in December, 1807.

129. FAMILY-MILL. To the person who shall invent and produce to the Society the best-constructed mill for grinding corn for the use of private families, or parish-poor;

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the construction to be such as to render the working of the mill easy and expeditious, and superior to any hitherto in use; the gold medal, or thirty guineas.

The mill, and *Certificates* of its having been used to good effect, to be produced to the Society on or before the first Tuesday in February, 1808. Cheapness and simplicity will be considered as essential parts of its merit; and the mill or a model, to remain with the Society.

130. MACHINE FOR RAISING COALS, ORE, &c. &c. To the person who shall invent a machine for raising coals, ore, &c. from mines, superior to any hitherto known or in use; and which shall produce the effect at a less expense than those already known, or in use; the gold medal, or fifty guineas.

A model of the machine, made on a scale of not less than one inch to a foot, with a *Certificate* that a machine at large on the same construction has been advantageously used, to be produced to the same Society on or before the second Tuesday in February, 1808.

131. IMPROVED WALKING-WHEEL, OR CRANE. To the person who shall invent an improved walking-wheel or crane, on which the weight and power of any person or persons shall be applied with the greatest safety and effect, and so contrived that the power can be varied according to the greater or less weight to be raised or lowered; the gold medal, or thirty guineas.

The model on a scale of not less than one inch to a foot, with a proper *Certificate* that the machine at large has been employed to good effect, to be produced to the Society on or before the second Tuesday in February, 1808.

132. MACHINE FOR RAISING WATER. To the person who shall invent a machine on a better, cheaper, and more simple construction than any hitherto known or in use for raising water out of wells, &c. from a depth of not less than fifty feet; the gold medal, or thirty guineas.

Certificates of the performance of the machine, and a model of it, on a scale of not less than one inch to a foot, to be produced to the Society on or before the first Tuesday in February, 1808.

133. ELM PIPES. To the person who shall invent and discover to the Society a substitute for the elm pipes now in common use for the conveyance of water, which shall be cheaper, equally effectual, and more durable than any heretofore employed; the gold medal, or thirty guineas.

It is required that one of the pipes so employed, an accurate *account* of the method used, and every expense attending it, together with satisfactory accounts of its being effectual, be delivered to the Society on or before the second Tuesday in January, 1808.

134. LAYING WOODEN PIPES. To the person who shall invent and discover to the Society a superior method of laying or connecting the wooden pipes now in use for conveying water, so as to lessen the injury they receive thereby; the silver medal, or fifteen guineas.

It is required that a model, an accurate account of the method used, and every expense attending it, together with satisfactory *Certificates* of its being effectual, be delivered to the Society, on or before the second Tuesday in January, 1808.

135. EXTINGUISHING FIRES. To the person who shall produce to the Society the best and most effectual method of procuring an immediate supply of water in case of fire, or for the means best calculated to prevent or extinguish accidental fires in buildings, superior to any now in use; the gold medal, or thirty guineas.

Certificates of the method having been practised with success, with a full description thereof, to be delivered to the Society on or before the second Tuesday in January, 1808.

136. BORING AND BLASTING ROCKS. To the person who shall discover to the Society a more simple, safe, cheap, and expeditious method than any hitherto known or in use, of boring or blasting rocks in mines, shafts, wells, &c.; the gold medal, or thirty guineas.

Certificates of the method having been practised with success, with a full description thereof, to be delivered to the Society on or before the first Tuesday in January, 1808.

137. HEATING ROOMS FOR THE PURPOSE OF MANUFACTURERS. To the person who shall invent and discover to the Society a method of heating rooms, superior to any hitherto known or in use, and at a moderate expenes, for the purpore of painters, japanners, and other manufacturers, so as to avoid the necessity of iron or copper tunnels going through the rooms to convey the smoke, whereby the danger from such tunnels may be prevented; the gold medal, or forty guineas.

A model or complete drawing and description of the method, with *Certificates* that it has been successfully practised, to be delivered to the Society on or before the last Tuesday in March, 1808.

138. IMPROVED VENTILATION. To the person who shall invent and produce to the Society a mode of permanently ventilating the apartments in hospitals, workhouses, and other crowded places, superior to any now

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known or used; the gold medal, or fifty guineas.

A model of the apparatus, and a full *account* of the means by which the effect has been produced, with proper *Certificates*, to be delivered to the Society on or before the last Tuesday in February, 1808.

139. PREVENTING ACCIDENTS FROM HORSES FALLING WITH TWO-WHEELED CARRIAGES. To the person who shall invent and produce to the Society a method, superior to any hitherto known or in use, to prevent accidents from the falling of horses with two-wheeled carriages, especially on steep declivities; the silver medal, or fifteen guineas.

A model of the apparatus, and a full account of the means by which the effect has been produced, with proper *Certificates* that the same has been used with success, to be delivered to the Society on or before the second Tuesday in January, 1808.

140. IMPROVING TURNPIKE AND OTHER ROADS. To the person who shall discover to the Society the most effectual and cheapest method, verified by actual experiments, of combining the materials ordinarily employed in making or repairing roads, so as to form them of the hardest consistency by their cementing properties, or by an artificial mixture of earth, stones, &c. altered by heat or any other mode, so as to form an even, hard, and durable carriage-road, not liable to be injured by heat or rain; the gold medal, or thirty guineas.

It is required that an accurate *account* of the method used, and every expense attending it, together with satisfactory *Certificates* of its being effectual, be delivered to the Society on or before the first Tuesday in March, 1808.

141. RAISING THE BODIES OF PERSONS WHO HAVE SUNK UNDER WATER. To the person who shall invent and produce to the Society a cheap and portable drag, or other machine, superior to those now in use, for the purpose of taking up, in the best and most expeditious manner, and with the least injury, the bodies of persons who have sunk under water; the gold medal, or thirty guineas.

The drag, or machine to answer the purpose intended, to be produced to the Society on or before the first Tuesday in March, 1808.

142. FOR PREVENTING PREJUDICIAL EFFECTS TO THE PERSONS EMPLOYED IN POINTING NEEDLES. To the person who shall invent and produce to the Society a mode of obviating the prejudicial effects that attend the operation of pointing needles, by grinding them dry, during which the particles of grindstone, dust, and steel, being thrown into the air, and received with it into the lungs, occasion asthma, consumption, and other painful disorders; the gold medal, or thirty guineas.

A model of the apparatus, and a full *account* of the means by which the effect has been produced, together with proper *Certificates* of its practicability and adoption, to be delivered to the Society on or before the second Tuesday in March, 1808.

PREMIUMS OFFERED FOR THE ADVANTAGE OF THE COMMERCE OF THE UNITED EMPIRE.

143. TAKING PORPOISES. To the people in any boat or vessel, who, in the year 1807, shall take the greatest number of porpoises on the coast of Great Britain or Ireland, by gun, harpoon, or any other method, not fewer than thirty, for the purpose of extracting oil from them; the gold medal, or thirty pounds.

Certificates of the number, signed by the persons to whom they have been sold or delivered for the purpose of extracting the oil, to be produced to the Society on or before the last Tuesday in January, 1808.

144. OIL FROM PORPOISES. To the person who shall manufacture the greatest quantity of oil from porpoises taken on the coast of Great Britain or Ireland, in the year 1806, not less than twenty tons; the gold medal, or thirty pounds.

Certificates of the oil having been made from porpoises actually caught on the coast of Great Britain or Ireland, and two gallons of the oil as a sample, to be produced to the Society on or before the last Tuesday in February, 1808.

145. CURING HERRINGS BY THE DUTCH METOHD. To the person or persons who shall, before January 1808, cure the greatest quantity of white herrings, not less than thirty barrels, according to the method practised by the Dutch, and equal in all respects to the best Dutch herrings, the same being caught in the British or Irish seas, and cured in a British or Irish vessel or port; the gold medal, or fifty guineas.

146. For the next greatest quantity, not less than fifteen barrels; the silver medal, or twenty guineas.

A sixteen-gallon barrel of the herrings to be produced to the Society on or before the first Tuesday in February, 1808, with *Certificates* that the conditions of the premium have been fulfilled, and that the whole were cured in the same manner as the specimen, together with a full description of the process

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employed, in order that the Society may judge how far the Dutch method has been adopted.

147, 148. The same premiums are extended one year further. *Certificates* to be produced on or before the first Tuesday in February, 1809.

PREMIUMS OFFERED FOR THE ADVANTAGE OF THE BRITISH COLONIES.

149. NUTMEGS. For the greatest quantity of merchantable nutmegs, not less than ten pounds weight, being the growth of his Majesty's dominions in the West Indies, or any of the British settlements on the coast of Africa, or the several islands adjacent thereto, and equal to those imported from the islands of the East Indies; the gold medal, or fifty guineas.

Satisfactory *certificates*, from the governor, or commander in chief, of the place of growth, with an *account* of the number of trees, their age, nearly the quantity of fruit on each tree, and the manner of culture, to be produced on or before the first Tuesday in December, 1807.

150. The same premium is extended one year farther.

Certificates to be produced on or before the first Tuesday in December, 1808.

151. KALI FOR BARILLA. To the person who shall have cultivated, in the Bahama Islands, or any other part of his Majesty's dominions in the West Indies, or any of the British settlements on the coast of Africa, or the several islands adjacent thereto, in the year 1806, the greatest quantity of land, not less than two acres, with Spanish kali fit for the purpose of making barilla; the gold medal, or thirty guineas.

152. For the next greatest quantity, not less than one acre; the silver medal, or fifteen guineas.

Certificates, signed by the governor, or commander in chief, for the time being, of the quantity of land so cultivated, and of the state of the plants at the time of signing such *certificates*, to be delivered to the Society, with samples of the kali, on or before the second Tuesday in January, 1808.

153. The same premiums are extended one year farther.

Certificates to be produced on or before the second Tuesday in January, 1809.

154. DESTROYING THE INSECT COMMONLY CALLED THE BORER. To the person who shall discover to the Society an effectual method of destroying the insect commonly called the Borer, which has of late years been so destructive to the sugar-canes in the West-India islands, the British settlements on the coast of Africa, and the several islands adjacent thereto; the gold medal, or fifty guineas.

The discovery to be ascertained by satisfactory *certificates*, under the hand and seal of the governor or commander in chief for the time being, and of some other respectable persons, inhabitants of the islands, or other place, in which the remedy has been successfully applied; such *certificates* to be delivered to the Society on or before the first Tuesday in January, 1808.

155. The same premium is extended one year farther.

Certificates to be produced on or before the first Tuesday in January, 1809.

156. CULTIVATION OF HEMP IN UPPER OR LOWER CANADA. To the person who shall sow with hemp, the greatest quantity of land in the province of Upper Canada, not less than six arpents, (each four-fifths of a statute acre) in the year 1807, and shall at the proper season cause to be plucked the summer hemp, or male hemp bearing no seed, and continue the winter hemp, or female hemp bearing seed, on the ground until the seed is ripe; the gold medal, or one hundred dollars.

157. To the person who shall sow with hemp the next greatest quantity of land in the same province of Upper Canada, not less than five arpents in the year 1807, in the manner above mentioned; the silver medal, or eighty dollars.

158. For the next greatest quantity of land, in the same province, and in a similar manner, not less than four arpents; sixty dollars.

159. For the next greatest quantity of land, in the same province, and in a similar manner, not less than three arpents; forty dollars.

160. For the next greatest quantity of land, in the same province, and in the same manner, not less than one arpent; twenty dollars.

Certificates of the number of arpents, the method of culture, of the plucking of the hemp, with a general *account* whether sown broad-cast or in drills, the expense, soil, cultivation, and produce, to be transmitted to the Society, certified under the hand and seal of the governor or lieutenant-governor, together with 28lb. of the hemp, and two quarts of the seed, on or before the last Tuesday in November, 1808.

161 to 165. Premiums exactly similar in all respects to those held out for the province of Upper Canada, are also offered for the province of Lower Canada, and are extended to the same period.

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166. IMPORTATION OF HEMP FROM CANADA. To the master of that vessel which shall bring to this country the greatest quantity of marketable hemp, not less than one hundred tons, in the year 1807, the produce of Upper or Lower Canada; the gold medal.

167. To the master of that vessel which shall bring the next quantity, not less than fifty tons; the silver medal.

Certificates satisfactory to the Society to be produced by the master of the vessel on or before the first Tuesday in February, 1808, to testify that such hemp was grown and prepared in Canada.

168. SUBSTITUTE FOR HEMP. To the person who, in the year 1808, shall discover and produce to the Society a substitute for hemp, equally cheap, durable, and applicable to all the purposes for which hemp is now used; the gold medal, or fifty guineas.

A quantity of the substitute, not less than one hundred weight, together with proper *certificates* from the governor or commander in chief, if raised in any of the British colonies, or from the Secretary of the Board of Trade, if raised in the East Indies, to prove that the same has been used with success, to be produced to the Society on or before the last Tuesday in February, 1809.

169. The same premium is extended one year farther.

Certificates to be produced on or before the last Tuesday in February, 1810.

PREMIUMS OFFERED FOR THE ADVANTAGE OF THE BRITISH SETTLEMENTS IN THE EAST INDIES.

170. BHAUGULPORE COTTON. To the person who shall import into the port of London, in the year 1807, the greatest quantity, not less than one ton, of the Baughulpore cotton, from which cloths are made in imitation of nankeen, without dyeing; the gold medal.

A quantity of the cotton, not less than five pounds weight, in the pod, and five pounds carded, to be produced to the Society, with proper *certificates*, signed by the Secretary to the Board of Trade of Bengal or Bombay, on or before the last Tuesday in Feb. 1808.

171, 172. The same premium is extended two years farther.

Certificates to be produced at the same time of the years ensuing.

173. ANNATTO. To the person who, in the year 1807, shall import into the port of London, from any part of the British settlements in the East Indies, the greatest quantity of annatto, not less than five hundred weight; the gold medal.

A quantity of the annatto, not less than ten pounds weight, to be produced to the Society, with proper *certificates*, signed by the Secretary of the Board of Trade of the respective settlement, that the annatto is the produce of such settlement, on or before the last Tuesday in February, 1807.

174, 175. The same premium is extended two years farther.

Certificates to be produced at the same time of the years ensuing.

176. TRUE COCHINEAL. To the person who, in the year 1807, shall import into the port of London, from any part of the British settlements in the East Indies, the greatest quantity of true cochineal, not less than five hundred weight; the gold medal.

A quantity of the cochineal, not less than ten pounds weight, with proper *certificates*, signed by the secretary of the Board of Trade of the respective settlement, that the cochineal is the produce of such settlement, to be produced to the Society on or before the first Tuesday in February, 1808.

177, 178. The same premium is extended two years farther.

Certificates to be produced at the same time of the years ensuing.

GENERAL CONDITIONS.

As the great object of the Society in rewarding individuals is to draw forth and give currency to those inventions and improvements, which are likely to benefit the public at large, candidates are requested to observe, that if the *means*, by which the respective objects are effected, do require an expense or trouble too great for *general purposes*, the Society will not consider itself as bound to give the offered *reward*; but, though it thus reserves the power of giving in all cases such part only of any premium as the performance shall be adjudged to deserve, or of withholding the whole if there be no merit, yet the candidates may be assured the Society will always judge liberally of their several claims.

All candidates are to take notice, that no claim for a premium will be attended to, unless the conditions of the advertisement are fully compiled with.

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All models of machines, which obtain premiums or bounties, shall be the property of the Society; and, where a premium or bounty is given for any machine, a perfect model and description thereof shall be given to the Society.

All the premiums of this Society are designed for Great Britain and Ireland, unless expressly mentioned to the contrary.

The claims shall be determined as soon as possible after the delivery of the specimens.

It is expected that all articles for claims or bounties be sent to the Society, carriage paid.

No person shall receive any premium, bounty, or encouragement, from the Society, for any matter for which he has obtained, or purposes to obtain, a patent, or for which he has obtained, or expects any premium or reward from any other Society.

A candidate for a premium, or a person applying for a bounty, being detected in any disingenuous method to impose on the Society, shall forfeit such bounty, and be deemed incapable of obtaining any for the future.

No member of this Society shall be a candidate for, or entitled to receive, any premium, bounty, or reward whatsoever, except the honorary medal of the Society. The candidates are, in all cases, expected to furnish a particular account of the subject of their claims; and where certificates are required to be produced in claim of premiums, they should be expressed, as nearly as possible, in the words of the respective advertisements, and be signed by persons who have a positive knowledge of the facts stated.

Where premiums or bounties are obtained in consequence of specimens produced, the Society mean to retain such part of those specimens as they may judge necessary, making a reasonable allowance for the same.

No candidate, not a member, shall be present at any meetings of the Society or committees, or admitted at the Society's rooms, after they have delivered in their claims, until such claims are adjudged, unless summoned by the Committee.

The Society, anxious to promote the Arts of their country, have adopted the resolution of forming a Collection of Prints, to be open for public inspection; and, having arranged those already in their possession, invite engravers to send etched or finished proofs of their plates: and hope that amateurs, collectors, and publishers of works of art, will also contribute to the undertaking.

Prints of machines, or maps, will also come within the above arrangement.

The Society farther invite the communications of scientific and practical men, upon all subjects connected with the views of the Society, although their experiments may have been conducted upon a smaller scale than the terms required by the premiums; as such communications may afford ground for more extensive application, and thus materially contribute to the advantage of the public.

The Library of the Society, which has already become very valuable, may yet receive considerable additions and improvements from the presents of members, or other persons who may be inclined to place useful books or valuable manuscripts in a repository, at once permanent and conducive to the national benefit.

All communications are to be made by letter, addressed to Dr. Charles Taylor, the Secretary, *at the Society of Arts, &c. Adelphi, London.*

The Winchester bushel is the measure referred to for grain; and, as the acres of different districts vary in extent, it is necessary to observe, that the Society mean Statute Acres of five and a half yards to the rod or pole, when acres are mentioned in their list of premiums; and they request that all communications to them may be made agreeably thereto.

The Society desire that the Papers on different subjects sent to them may be full, clear, explicit, fit for publication, and rather in the form of Essays than of Letters; and that descriptive Drawings may be sent, with the Models and Machines laid before the Society.

*** To persons inclined to leave a sum of money to this Society by will, the following form is offered for that purpose.

Item. I give and bequeath to A. B. and C. D. the sum of upon condition and to the intent that they, or one of them, do pay the same to the Collector, for the time being, of a Society in London, who now call themselves the Society for the Encouragement of Arts, Manufactures, and Commerce; which said sum of I will and desire may be paid out of my personal estate, and applied towards the carrying on the laudable designs of the Society.

N. B. The Society for the Encouragement of Arts, &c. considering that it would be beneficial to the Commerce of the United Kingdom to bring the British Marbles into more general use, and that the most effectual method of accomplishing their object would be, for the present, *to make them more generally known in the capital, have come to the following resolutions:—*

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Resolved,—That specimens of British Marbles be exposed in the Society's Rooms at the Adelphi, for the inspection of the public, under the following regulations:

1st, That all specimens be exact to a given size, *viz.* eight inches high, six inches broad, one inch thick, and polished on one face.

2d, That a book be kept, containing the number of each specimen, and describing the situation of the quarry, the name of the parish where situated, the distance of the quarry from a beaten road, and the distance of that road from water-carriage, with the name of the donor and proprietor. Any remarks on the qualities of the marbles, or on the lime produced from them, will be gratefully received and preserved by the Society, as materials for future inquiries.

Resolved,—That as the exertions of the Society can be beneficial to the public, only inasmuch as their views are seconded by the public, the Society request, that all persons, proprietors of marble quarries, will favour them with a specimen of the marble, worked to the exact size above mentioned, with the description of the quarry as above, that the same may be entered in the book to be preserved for the use of the public.

Premiums and Rewards bestowed in May, 1807, by the Society of Arts, Manufactures, and Commerce, Adelphi.

ON Tuesday the 26th of May, 1807, the Rewards of the Society were, as usual, distributed by his Grace the Duke of Norfolk, arranged under the following classes; and on Wednesday the 3rd of June, the Society held the last Meeting of that Session, and adjourned to the fourth Wednesday in October next.

IN AGRICULTURE.

To David Day, Esq. of West-hill, near Rochester, for plantations of ash trees, and accurate accounts of the profits attending them, the silver medal.

To Major Spencer Cochrane, of Muirfield House, near Haddington, North Britain, for the culture of spring wheat, and the use of the extract of poppies in diseases of cattle, the silver medal.

To Mrs. Hannah D'Oyly, of Sion Hill, near Northallerton, Yorkshire, for a new method of rearing poultry to advantage, the silver medal.

IN CHEMISTRY.

To the Right Hon. Lord Ribblesdale, of Gisburne Park, for his communication respecting a mine of zinc, and his application of the ore as a paint, the silver medal.

To Mr. Edmund Turrell, 40, Rawstorne-street, Goswell-street Road, for his construction of muffles for chemical purposes, ten guineas.

IN POLITE ARTS.

To J. Flaxman, Esq. R. A. Buckingham Place, for the design of the Society's new medal, modelled and presented by him, the first gold medal.

To Miss Maria Denman, Buckingham-place, for her drawings of the new medal, the silver medal.

To Miss S. C. Day, Lower Bryanstone-street, Portman-square, for an original drawing of the teacher taught, class 87; the silver medal.

To Miss Barrow, Navy Pay Office, Somerset-house, for a drawing of the Castle Acre Priory, Norfolk, class 88; the silver medal.

To Miss Eliza L. Jones, of Leadenhall-street, for an original drawing of the mill at Redbourne Bury, class 97; the silver medal.

To Edward Bury, Esq. Pulteney-street, Bath, for an original painting of a view from King's Weston of Lord de Clifford's house and adjacent country, the silver medal.

To Joseph Woollett, Esq. Gould-square, Crutched-friars, for an original drawing of West Horsley, Surrey, the silver medal.

To Mr. Henry Parke, Dean-street, Soho, for a drawing of shipping, the silver medal.

To Miss Brooke, Cork-street, Burlington-gardens, for a miniature painting of Angelica and Medoro, the silver medal.

To Miss Louisa George, Park-place, St. James's, for a drawing of King Edward IV. and Lady Grey, the silver medal.

To Miss Aspinall, Quality-court, Chancery-lane, for a drawing of a dying warrior, the silver medal.

To Miss Hannah Hancock, St. Helen's, Norwich, for an oil painting, from a copy by Gasper Crayer, of Rubens's Antwerp Altar Piece, the silver medal.

To Mr. J. B. Lane, South-street, Finsbury-square, for an original historical drawing of the four angels unloosed, class 91; the gold medal.

To Mr. William Fuller Pocock, Southampton-street, for an original ornamental drawing of an architectural design, the silver medallion of the society, *in conformity to the*

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will of the late John Stock, Esq. of Hampstead, class 108.

To Anthony Cardon, Esq. of London-street, Fitzroy-square, for his engravings of the battle of Alexandria, and of the principal officers engaged in the Egyptian expedition, the silver medal set in gold.

To Lewis Schiavonetti, Esq. V. A. for his engraving of the landing of the British troops in the bay of Aboukir, the silver medal set in gold.

To Mr. R. Branston, Wynyat-street, Islington-road, for his engraving on wood, of a scene in the play of King John, class 106; the silver medal.

To Mr. Robert Carpenter, Bathwick, Bath, for a carving in wood of Abigail, the wife of Nabal, supplicating David, the lesser silver pallet.

To Miss Hillier, Holles-street, for a drawing of a sycamore branch, the greater silver pallet.

To Miss F. H. Barlow, Somerset-place, Somerset-house, for a drawing of flowers, the greater silver pallet.

To Miss Hilare Barlow, Somerset-place, Somerset-house, for a drawing of a landscape, the greater silver pallet.

To Miss Maria Denman, Buckingham-place, for a beautiful plaster model of a Cupid's head, the silver medal.

To Mr. Thomas Denman, High Holborn, for a plaster model of Antinous, the lesser silver pallet.

To Mr. Henry Sass, King-street, Holborn, for an outline of the Laocoon and two Sons, class 93; the silver medal.

To Mr. Henry Daniel Thielcke, Stafford-place, Pimlico, for a drawing of the Hercules Farnese, class 98; the silver medal.

To Mr. W. Finden, Warren-street, Fitzroy-square, for a drawing of the Hercules Farnese, the greater silver pallet.

To Mr. Thomas Jameson, of Ambleside, Westmoreland, for an original drawing of a landscape, the greater silver pallet.

To Mr. Denis Dighton, Charing-cross, for an original drawing of Julius Cæsar landing in Britain, the greater silver pallet.

To Master W. C. Ross, Bow-street, Covent-garden, for a drawing of the death of Wat Tyler, the lesser silver pallet.

IN MANUFACTURES.

To Mr. Alexander Duff, Church-street, Bethnal-green, for an improved machine for weaving figured work, fifteen guineas.

IN MECHANICS.

To Mr. George Smart, of Westminster bridge, for his machine for cleansing chimnies without the aid of climbing boys, class 133; the gold medal.

To Mr. Joseph Davis, 14, Crescent, Kingsland-road, for his machine for cleansing chimnies without the aid of climbing boys, class 134; the silver medal.

To Mr. Christopher Wilson, Richard-street, Commercial Road, for a secure sailing boat, or life-boat, the gold medal.

To Mr. F. C. Daniel, Wapping, for his apparatus to secure persons from sinking in water, or a life-preserver when shipwrecked, the gold medal.

To Mr. J. W. Boswell, Hatton-garden, for his method of preventing the surging of a cable, the gold medal.

To Mr. William Hardy, St. John-street, Clerkenwell, for equalizing the long and short arcs of vibration in timekeepers, the silver medal.

To Mr. Henry Ward, of Blandford, Dorsetshire, for a compensation pendulum, the silver medal.

To Mr. S. Mendham, Counter-street, Borough, for a watch escapement, the silver medal.

To Mr. J. Broad, Downing-street, for his guage, or measure for timber, the silver medal.

To Mr. A. Stass, 18, Porter-street, Newport-market, for a machine for closing boots in a standing posture, the silver medal.

To Mr. Gilbert Gilpin, Old Park Iron Works, near Shiffnall, for his machine for raising coals or other articles from mines, twenty guineas.

To Mr. Charles Le Caan, of Llanelly, in Wales, for improved tram plates for carriages on rail roads, twenty guineas.

To Mr. Joseph Collier, 11, Crown-street, Soho, for an iron stove for ship use, or domestic purposes, fifteen guineas.

To Mr. Richard Drew, Great Ormond-street, for a balance level for land to be irrigated, ten guineas.

To Mr. Martin Furniss, Strand, for a new air-tight door hinge, ten guineas.

To Mr. Joseph Davis, 14, Crescent, Kingsland road, for securing window pannels and door pannels from being cut out by housebreakers, ten guineas.

COLONIES AND TRADE.

To William Bond, Esq. of Canada, North America, for useful information relative to improvements in Canada, the silver medal.

The number of Members elected since October, 1806, *is* 142.

The List of Premiums offered may be had, *gratis*, at the Society's House in the Adelphi;

By Order of the Society,

June, 1807. CHARLES TAYLOR, M. D. Secretary.

C. WHITTINGHAM, Printer, 103, Goswell Street.

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RULES AND ORDERS

OF THE

SOCIETY.

DECEMBER 30th, 1807.

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RULES

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RULES AND ORDERS.

SECT. I.

Of the Officers, and Manner of their Election.

I. THERE shall be One President, Sixteen Vice-Presidents, Two Chairmen to each of the standing Committees of the Society, a Secretary, an Assistant Secretary, a Housekeeper, and a Collector of the subscription money; which officers shall be elected, by ballot, on the twenty-second day of March, annually; unless when that day happens on a Sunday, or Good Friday, or Public Fast-day, in any of which cases the election to be on the following day; and on that day no other business of the Society shall be transacted.

II. In order to this election, the President, one of the Vice-Presidents, or, in their absence, some other member appointed by the majority, shall take the chair at eleven of the clock in the forenoon; two ballotting glasses, marked A. and B., shall be placed before the chair, the one for receiving the balloting lists marked (A.), and the other for receiving the ballotting lists marked (B.), and stand open for receiving lists until two of the clock in the afternoon: at which hour the ballot shall be closed, when three scrutineers to each ballotting glass shall be nominated

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by the President, or presiding member, to examine the lists; but, in case not more than five members shall attend to vote on that day, the officers of the preceding year shall be continued till the next general election. That at the beginning of every election of a President, Vice-President, or Vice-Presidents, Chairman or Chairmen, the presiding member shall begin by calling over the names of the persons proposed as candidate or candidates for that election, in order that it may be known whether such candidate or candidates be in arrear.

III. A sufficient number of printed ballotting lists of all the officers in being, according to the forms annexed (A. B.) shall be ready; in which if any member chooses an alteration, he is to strike his pen across the printed name or names of such as he disapproves, and write on the blank side the name or names of such as he would substitute in their place.

IV. Each member shall deliver his lists folded up to the President, or presiding member, to put into the glasses; and the collector, sitting on the side of the chair, with a list of the members before him, shall mark the name of each member so delivering in his lists.

V. When the ballot is closed, one of the scrutineers shall open and read aloud each list, and file it, while the other two or more mark the names; and when all the lists are drawn, the marking scrutineers shall cast up and report the same to the chair; after which, the President, Vice-President, or presiding member, shall declare the persons who have the majority of votes to be the officers respectively for the ensuing year.—Such election shall likewise be declared again at the next meeting of the Society.

VI. If the President, or any of the Vice-Presidents, shall

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shall resign or die, the remaining Vice-Presidents shall continue to act and preside at the meetings of the Society, in the order they are placed in the election list, until the next annual meeting for the choice of officers, or some other general, or extraordinary general meeting, which the Society shall please to appoint for such particular election.

VII. If any of the officers of Secretary or Assistant Secretary, Housekeeper, or Collector, shall become vacant, a person shall be appointed, at the next meeting of the Society, to act in such respective office of Secretary, Assistant Secretary, Housekeeper, or Collector, until the next general meeting, or an extraordinary general meeting, which shall be appointed for electing a person by ballot, to fill the vacant office for the remaining part of the year.—In case the office of Secretary, Assistant Secretary, Housekeeper, or Collector, be at any time resigned, which resignation shall take place on a subsequent day: it shall be in the power of the Society to proceed to the election of a proper person to fill such office on such resignation taking place, or to nominate one to hold it *pro tempore*, until such office shall be filled up. But no person shall be entitled to ballot at the election of any of the said officers, in case of a vacancy by death, resignation, or removal, who shall not have been a member previous to the declaration of such vacancy, unless he shall become a perpetual member.

VIII. At all elections of officers, if the suffrages should be equal, the decision shall be by lots, prepared by the scrutineers, and drawn by the President, Vice-President, or presiding member.

IX. Notice of the annual, or of any occasional election of officers, shall be published three different days, in such

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newspapers as the Society shall order, one week at least before the day of election.

X. Notwithstanding the election of officers is annual, the Society reserve to themselves the power of removing either their Secretary, Assistant Secretary, Housekeeper, or Collector, by two general or extraordinary general meetings; in which case the said officers shall be paid their salaries in such proportions as may be then due to them.

XI. Neither the Secretary, Assistant Secretary, the Housekeeper, nor the Collector of the Subscriptions, shall be members of this Society.

XII. No person, except he shall have been an officer the preceding year, shall be admitted as a candidate for any lucrative employment, without having personally presented his petition or memorial to the Society, sixteen days before the day of election; which petition or memorial shall be read immediately after the first, and again after the second reading of the minutes. "And in case of its being referred to "a committee to examine and report on the qualifications of "the candidates for any lucrative office, such committee shall "not enter on their examination of the candidates, until "within fourteen days of the day fixed for the election, (of "which meeting for examination notice shall be given to all "the candidates,) and they shall examine all the candidates "who attend for such purpose, in the order in which their "names occur in the alphabet." No member of this Society shall be eligible as a candidate for any lucrative employment in the gift of the Society, who shall be present, or act as a member, at any meeting or committee of the Society, after he has declared by word, message, or otherwise, his intention of becoming a candidate.

XIII. No officer who receives a salary, or servant, shall be

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be entitled to any premium or bounty whatever from the Society.

XIV. No officer, or servant, shall presume under any pretence whatsoever, to accept of any present or gratuity from any candidate for a premium or bounty, or any tradesman having dealings with the Society, or any person coming to see the machines, on account of such premium, bounty, dealing, or inspection.

XV. No officer, servant, or person, employed to shew the machines in the several repositories, shall accept any gratuity from the maker or seller of any machines made after models or machines, for which the Society have adjudged any premium or bounty.

XVI. A Messenger shall be chosen or removed at any meeting of the Society; and so long as he continues in their service, he shall be paid a salary of seventy pounds a year.

SECT. II.

Duty of the President, Vice-Presidents, and Chairmen.

I. THE duty of the President, Vice-President, (in the order they appear in the list), or Chairman, is to preside at all meetings, with his hat on if he pleases, to regulate the debates of the Society; to state and put questions, both in the affirmative and negative, according to the sense and intention of the meeting; to check irregularities, and keep all persons in order; to direct summonses for all extraordinary general meetings; and to execute, or see to the execution, of all the rules and orders of the Society.

II. The President, or any one of the Vice-Presidents, shall sign receipts for the subscription money.

SECT.

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SECT. III.

Business of the Secretary.

I. HE shall attend all meetings and committees of the Society: he shall take down all minutes of the committees, and produce them fairly written, at the ensuing meetings. He shall read all the minutes of the meetings and committees to the Society; and translate such communications into English as shall be in any other language. He shall prepare all answers, when ordered by the Society, in such language as shall be directed, and lay the same before the Committee of Correspondence, for their examination, unless the Society shall judge an immediate answer necessary. He shall prepare an annual historical register of the Transactions of the Society, beginning every year from the first day of July, and ending the last day of June following. This register shall contain an account of all premiums bestowed, with the names of the persons who have received them, digested under proper heads; a list of the premiums offered by the Society, and upon what condition, and the number of members. He shall also prepare an account of the amount of annual and life subscriptions separately, the money in the Bank, and in the Collector's hands, as they shall have stood on the last day of June, and of other sums received during the preceding year; and what have been the expenses, in officers, servants, apartments, and workmen's and tradesmen's bills of all sorts. He shall prepare the list of members, advertisements, and other publications ordered by the Society; and take care that the same be properly and correctly printed: and his name, or that of the Assistant Secretary, as by order of the Society, shall be signed to all publications. All the letters or written papers of the Society shall be kept under

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under his care, and ready to be produced by him for the inspection of the members. He shall visit manufactories, or apply to manufacturers for information, when required by the Society; and he shall, as much as possible, endeavour to make himself acquainted with the nature and circumstances of the several arts and manufactures of this and other countries.

II. The Secretary shall read the whole of the Eleventh Section of the Book of rules and Orders, at the time when the standing Committees are appointed to be declared in the Society; and also at the opening of the business in the general committee of election, ordered to be holden on the Friday following annually. And in consideration of his constant attendance, abilities, and diligence, he shall be paid a salary of two hundred and fifty pounds a year, and be supplied with coals and candles.

SECT. IV.

Business of the Assistant Secretary.

I. THE Assistant Secretary shall attend every day at the office of the Society from the hours of ten to two, during the sessions of the Society, and such further time as may be necessary to perform the business of the Society in his department, and at all meetings of the Society, and read the letters received. He shall likewise attend committees, when particularly ordered by the Society, or by one of the Chairmen of such Committees. He shall take down all minutes of the Society's proceedings, and produce them fairly written in the Minute book of the Society, at the ensuing meeting. He shall enter in the Reward book, under their proper classes, the rewards bestowed by the Society, and make indexes to all the Minute books, and to the Transactions of the Society intended for publication. He shall

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shall paste all letters and papers in the Guard book. All the written books of the Society shall be kept in the Society's office for the inspection of the members. He shall transcribe all papers or letters that have been prepared by the Secretary or approved by the Society, or by the Committee of Correspondence and Papers. He shall together with the Secretary examine the proofs and revises of the Society's publications—And as a satisfaction for such services he shall be paid a salary of one hundred and twenty pounds a year.

II. Any member having obtained leave to take copies of the proceedings or papers of the Society, shall pay to the Assistant Secretary, for writing the same, after the rate of two-pence for every hundred words.

SECT. V.

Business of the Housekeeper.

I. THE Housekeeper shall have an apartment in the house of the Society, that she may be ready on the spot to receive messages, letters, and all matters brought to the Society; to answer all enquiries; and deliver plans, lists, &c. to such members as shall come or send for them, of which she shall take care to have a sufficient number. She shall have the custody and care of all the furniture, books, such papers as the Society shall think proper, and other effects whatever, belonging to the Society. She shall have the direction of all the inferior servants. She shall receive and have charge of all the matters sent to the Society by candidates for premiums, and shall enter them properly, at the time when delivered, in a book for that purpose. She shall keep a fair inventory of all the goods and effects of the Society, to be always ready when called for. She shall keep an account of all stationary ware, printed books, coals, candles,

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candles, and all other particulars sent in by tradesmen for the use of the Society, in a Day-book for that purpose; and shall enter the same fairly, under their several heads, in another book, to be laid every month before the Committee of Accompts, as a check on tradesmen's bills. For all which services she shall be paid a salary of seventy pounds a year; and fifty pounds to pay the servants, for cleaning the rooms and furniture; and other incidental charges to which she is liable.

SECT. VI.

Business of the Collector.

I. THE Collector shall give such security as the Society shall require, for the trust reposed in him. He shall collect the subscription-money from the members, as it becomes due, paying all he collects into the Bank of England, in the names of the two chairmen of the Committee of Accompts for the time being. He shall attend all Committees of Accompts; and at every meeting of the Society he shall lay before them the Bank-Book, with an account of what money he has received, paid into the Bank, or remains in his hands. He shall keep the cash accompt of the Society, and draw out exact lists of the members, with the sums contributed by each, and arrears due. He shall deliver to the chairman of the Committee of Accompts, on the last day of January in every year, an account of the members who have paid in the preceding year, as likewise how many were elected, declined, or remained in arrear in that year. For all which services he shall be allowed one shilling in the pound, on all such contributions, but not on legacies and particular donations. He shall attend all meetings and committees of the Society, and inform them of all matters necessary for them

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them to know; for which he shall receive thirty pounds a year.

II. And whereas a Collector, with whose conduct the Society may be well satisfied, may happen to be unavoidably prevented, through sickness or accident, from performing his duty, at a time when it may be prejudicial to the Society to have the collection delayed; or a Collector may have given such cause of dissatisfaction as to render his suspension expedient, and the time requisite for a proper examination into his conduct, before he may be either restored or justly removed, may occasion a prejudicial delay in the collection; the Society to obviate these inconveniences, reserve to themselves the power of suspending, in the latter case, a Collector at any ordinary meeting when twenty members at the least are present; and upon confirmation of such suspension, of appointing, in either of the said cases, a temporary Collector, which appointment shall not require confirmation.

SECT. VII.

Meetings of the Society.

I. THERE shall be five General Meetings every year, in the great room of the Society, at seven of the clock in the evening precisely, viz. on the first Wednesday in February, the third Wednesday in April, the second Wednesday in May, the second Wednesday in November, and the second Wednesday in December: At which meetings, or at any extraordinary general meetings only, if fifteen members at least are present, rules and orders for the government of the Society may be made, and altered; and such rules, orders, and alterations, being approved

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approved at the next succeeding general or extraordinary general meeting, shall be valid and binding.

II. An Extraordinary General Meeting may be called, if twenty members, at the least, are present, and the majority shall desire such extraordinary general meeting; which extraordinary general meeting shall be advertised three days successively in two of the daily papers: And if fifteen members are present they may proceed to business.

III. No proposition shall be offered to the Society, as matter of new rule and order, or which shall contain in it an alteration or amendment, of any established rule and order, unless delivered in by a member, ten days before a general meeting of the Society, to the Secretary, who shall immediately cause copies to be made of it, and to be hung up in the Society and Committee Rooms, containing the date of the ensuing General Meeting when the same is to be taken into consideration. At the next general meeting, the Secretary shall, immediately after reading the minutes of the preceding meeting, read all such propositions once over, according to the order they have been delivered in; which propositions shall be read a second time, with a proper pause after each; and if any of those propositions be moved and seconded, it shall then be taken into consideration.

IV. All new rules and orders, once passed, are to be hung up in the Society's room till they are confirmed, with the date when passed the first time, and when to be confirmed.

V. All new rules and orders shall be signed by the President or the Vice-President, and undersigned by the Secretary, and hung up in the Society-room and Committee-room, for the information of the members, till such time

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as they are inserted in their proper places in the subsequent printed book of rules and orders.

VI. The ordinary Meetings of the Society shall be held on Wednesday in every week, at seven of the clock in the evening precisely, from the fourth Wednesday in October, to the first Wednesday in June; and from the first Wednesday in June to the fourth Wednesday in October there shall be no meeting of the Society, unless called by the President, or two Vice-Presidents, on extraordinary occasions; and proper notice given thereof in the daily papers: And if at such ordinary meetings there should be present eleven or more members, they may proceed on business; but, in case there should not be eleven members present at seven o'clock, they may proceed on business with nine members only. And the said meetings shall have power to appoint such committees as they think necessary.

VII. An extraordinary meeting, for the doing of common business only, may be at any time ordered by the Society, in the same method as an extraordinary general meeting.

SECT. VIII.

Order of the Proceedings of the Society.

I. THE book of Rules and Orders, List of Premiums and of Members, shall lie upon the table before the President, or presiding member, at all meetings; and before the Chairman at all committees.

II. Each member is at liberty, before the President, Vice-President, or presiding member, takes the chair, to deliver to the Secretary, in writing, the names of no more than two persons whom he desires to be admitted auditors at that

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that meeting; which names the Secretary shall enter in a list, together with the name of the proposer. The list shall be read as soon as the chair is taken, and, if not objected to, the Collector shall carry the same to the Committee-room, and there call over the several names; when the persons allowed to be present may enter the great room, and seat themselves among the members, but shall not be permitted to debate or vote.

III. Persons desirous of being admitted auditors, are to remain in the Committee-room, until their names are called over by the Collector.

IV. No person to be admitted an auditor at any meeting of the Society, unless introduced by a member; nor shall any member propose an auditor to be admitted after the chair is taken.

V. No auditor to be admitted at the meetings of the Society but those who shall have obtained leave of the Society, or members of the Societies of the same kind in Scotland and Ireland.

VI. No member, whose subscription shall be beyond the current year in arrear, shall be at liberty to propose an auditor to be present at any meeting of the Society; and the Collector is directed to attend to this circumstance.

VII. At all meetings, business shall begin at seven o'clock in the evening, with reading the minutes of the preceding meeting: but no part of such minutes shall be discussed till the whole has been read through.

VIII. Candidates shall be ballotted for; and, during the ballot, the business of the evening shall be proceeded on.

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IX. The minutes shall be read a second time; and no other matter shall be proposed till the said minutes have been discussed, article by article: and all parts of the minutes, which are not objected to at the second reading, shall stand confirmed.

X. The President, after the first, and also after the second reading of the minutes, is to declare, that every member is entitled to vote and assist in all the transactions of the Society and its Committees, unless his first subscription shall not have been paid; and that no member shall speak more than once, on one and the same question, unless called upon from the chair to explain himself, excepting only the original proposer of any new motion, who shall be allowed the liberty of replying once on such occasion; and that no person is entitled to be present at any meeting or committee, whose subscription shall be at any time for two full years in arrear; and that no person shall be entitled to debate, or vote at any meeting or committee, until his subscription for the current year, and all arrears, are paid.

XI. Reports from committees shall be made; and the adjournment of those committees, which have not finished the business referred to them, shall be declared to the Society.

XII. All reports from the different committees shall be made to the Society in succession, according to their respective dates, unless when ordered otherwise by the Society.

XIII. A report from a committee, except in the case of a bounty, shall not be recommitted but by a majority of two thirds.

XIV. The report from the Committee of Accompts is to be made between the first and second reading of the minutes, the next Wednesday succeeding the audit.

XV. New

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XV. New matter to be considered.

XVI. The president or presiding member, shall then read over to the Society the subjects the committees are to discuss the following days.

XVII. Letters to be read.

XVIII. No question shall be put on any motion, unless the motion be seconded.

XIX. No motion shall be permitted for the repealing any confirmed resolution of the Society, till such resolution has been in force three months; nor shall any motion that has been rejected be made again, till after three months from the time of its rejection.

XX. No new proposition shall be entered upon after ten of the clock at night.

XXI. No member, on any pretence whatsoever, shall be at liberty to move, that he may have leave to make a motion after ten of the clock.

XXII. No premium shall be offered to the public, unless it has been approved of by a committee, and agreed to by the Society, at one meeting, if the premium shall have been already published in the Society's transactions; or at two meetings of the Society, if it be a new premium: and no premium or bounty shall be given to any candidate, unless the Society, at two meetings, shall be satisfied that such candidate does really deserve the same.

XXIII. When any proposal is made for a premium or reward, and the motion made and seconded, it shall be delivered to the chair in writing, and the same shall be read twice.

XXIV. No motion shall be made for the dispensing with

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delivered in, signed by the proposer by the Secretary, who shall insert the didates, to be hung up in the Society the second following ordinary meeti which such persons shall be balloted fourteen days between the meeting proposers, together with the name an son to be balloted for, shall be put u on the box, during the time of such l having a sufficient number of balls, s of the present balloting members, an members then voting shall ballot in h deemed a perpetual member, upon guineas at one payment; or a subs payment of any sum, not less than (BB). Peers of the realm, and Lord sirous of becoming members of this S being proposed at any meeting of the ately balloted for. Ladies are eligibl Society; are entitled to attend and vo and committees, and are alone entitle elections only, through the medium of is a member, but such member mu authority from the lady for whom he

II. In election of members, a sec granted, if immediately demanded.

III. Every person, upon his electio scription-money; or one of the mer make the deposit, in his name, in cas

IV. Every member shall pay his s arrear within one month after he h letter from the Collector for that purp

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" hereafter be a candidate for, or e
" mium, bounty, or reward, excep
" the Society ;" and also, that the
responding members, as often as
favour them with accounts of such
provements in any of the polite or
come to their knowledge.

SECT. XI

Of Committe

I. THE standing committees fc
clared, and the members thereof sh
ciety, at eight o'clock, on the firs
and a general committee of electio
men and members of the several co
cially summoned, shall meet on the
take into their consideration the cho
each of the several committees for t
report their names to the Society on
in March, as proper persons to serve
spective committees, under the titl
be severally inserted, as follows :

Committee of Accompts.
Correspondenc
Agriculture.
Chemistry, Dy
Polite and Lib
Manufactures.
Mechanics.
British Colonie
Miscellaneous

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which business also shall be declar
And three members shall constitute a

VIII. In order that every member
formed of the times of the meetings c
tees, in general cases they are fixed in t

Committees of Correspondence
Monday.
Colonies and Trade, and Manufact
Mechanics, on Thursday.
Polite Arts, on Friday.
Chemistry, on Saturday.
Accompts, in the first week in eve

IX. It is the duty of a chairman t
tion be put to the committee, unle
present; and, before an adjournmer
or report concluded, that the minut
by the chairman, who shall certify t
least were present. And the chairma
the reports of the committee in whi
such reports are made to the Society.

X. The chairman shall take care th
the committee be appointed, and
made, fairly written and without b
one or more of the subjects ref
sideration have been disposed of
deem it requisite to gain further d
ciety; but in case upon appointm
sufficient number do not attend, th
to appoint another day, and shall
summon the committee on a future da
less than three days inclusive.

XI. There shall be constantly hu
room and committee-room, a list of

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fying the business they are to consider, and the days they are appointed to meet.

XII. No pecuniary or other reward shall be given to any candidate for a premium or bounty, for his trouble or attendance on any committee, to whom such matter shall be referred by the Society for their consideration, unless by order of the Society.

XIII. All references to the several committees shall be entered in the respective committee-books, in one list, at the beginning of such books, in order that the subjects of them may be regularly taken up.

XIV. Lists of reports that are ready to be made, or standing for confirmation with their dates, shall always be hung up in the great room.

XV. Every committee shall direct the Secretary to write to one or more of the persons subscribing any certificate in claim of a premium in Great Britain, or to such other person as the committee may think proper, for a further information of the truth of such certificate, and shall wait for an answer as to the reality of their having signed the same, before the adjudication of such premium.

SECT. XII.

Of Rewards.

I. THE chief objects of the attention and encouragement of the Society, in the application of their rewards, are ingenuity in the several branches of the polite and liberal arts; useful inventions, discoveries, or improvements in agriculture, manufactures, mechanics, and chemistry; or the laying open any such to the public; and in general all such useful inventions, discoveries, or improvements, as may

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may appear to have a tendency to the advantage and commerce.

II. The Society reserve to themselves the power in all cases, such part only of any premium as formance shall be judged to deserve, or reser whole if there be no merit.

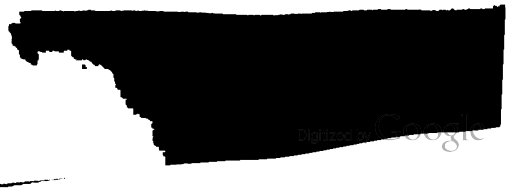
III. The premiums of this Society shall extend t Britain and Ireland, and all the British Isles.

IV. No member of this Society shall be a candi or entitle to receive, any premium, bounty, or rewar soever; except only the honorary medal of the And no member having delivered in his claim for a mium offered by the Society and afterwards withdra same, shall be entitled to take a part in the deliberat vote on the claims of other candidates who may hav ed such premium.

V. No member who is a candidate for the honora mium or medal of this Society, shall be of the com to which such matter may be referred; or ever pres their sittings, while the subject is under consideration less called in to answer such questions as the committe propose: nor shall any such candidate be present i Society when the matter is before them, whether in d or for determination, unless called in. Which rule members being such candidates, are strictly to ob under penalty of forfeiting their title to such medal, withstanding any determination of the Society in favour.

VI. If any member shall be afterwards found to transgressed the rules mentioned in the preceding re tions, by the means of a borrowed or fictitious name, member shall be expelled the Society.

VII



VII. No member, who is the father, son, or master of a candidate for a premium, bounty, or reward, nor any person any-wise lucratively interested in such an event, shall be of the committee to which such matter is referred; nor present in the Society when it is under consideration, unless called in, under penalty of excluding such child, father, scholar, apprentice, or servant, from all title to any such premium, bounty, or reward, notwithstanding a determination of the Society in their favour.

VIII. A candidate for a premium, or person applying for a bounty, being detected in any disingenuous methods to impose on the Society, shall forfeit any such premium or bounty, and be deemed incapable of obtaining any for the future.

IX. No candidate who is not a member, shall be present at any of the meetings of the Society or committees, or admitted at the Society's rooms, after they have delivered in their claims, till such claims are adjudged, unless summoned by the committee, under forfeiture of the premium or bounty, for which they are candidates.

X. No machine or model of a machine shall be admitted to claim a premium, unless the whole and every part thereof, shall be delivered into the Society's office at or before the time appointed by the Society. And, if any candidate shall secretly make addition to, or alteration in his machine or model, otherwise than by repairing and putting the several parts together, after it is lodged with the Society, he shall on discovery be deemed incapable of receiving any premium.

XI. The Society shall, whenever they think proper, desire the assistance of such gentlemen, manufacturers, or others, though not members of it, as shall be deemed best able

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able to judge of, and discover the truth and value of any matter or thing for which a premium has been claimed.

XII. No medal or sum of money, shall be given as a bounty or reward for any thing not mentioned in the list of premiums at any time, unless fifteen members are present; and the majority to bestow such medal or sum of money, shall consist of two-thirds at least of the members then present; the same to be confirmed by ballot.

XIII. If a claim for a premium shall be rejected by the Society, no motion shall be made for giving to the candidate, in lieu of such premium, any bounty of equal honour or value with the premium offered.

XIV. Every person who shall receive any premium or bounty from the Society, shall relinquish all pretensions to a patent for any matter for which he has obtained such premium or bounty. No model or machine, for which a patent has been obtained, or is proposed to be obtained, shall be admitted into the repository of the Society.

XV. No member who has obtained a patent for any article similar to such as may be produced to the Society, shall be allowed to vote either in the committee or Society on that subject.

XVI. If any reward be conditionally voted by the Society, and the imposed conditions be not completed within one year from the time of such vote, the reward is to be considered as void, unless further time shall be granted by the Society for complying with the said conditions, in consequence of an application in writing made by or from the said claimant.

XVII. The several candidates and claimants to whom the Society shall adjudge premiums or bounties, are to attend at the Society's House, in the Adelphi, on the last Tuesday in

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in May of that session, at eleven in the morning precisely, to receive the same; that day being appointed by the Society for the Distribution of their Rewards: and before that time no premium or bounty will be delivered, except to those who are about to leave the kingdom.

In cases where the Society may think fit to admit excuses for not attending in person, deputies may be substituted to receive the rewards, provided such deputies are either members of the Society, or superior officers thereof.

SECT. XIII.

Resolutions.

I. THAT all models of machines, for which persons obtain premiums or bounties, shall become the property of the Society, and correct written descriptions be furnished with them, and where machines are rewarded, that complete models or correct drawings, and proper written explanations, be delivered to the Society by the persons entitled to such rewards.

II. All the written accounts, for which any premium is offered and given, or for which the Society have given a bounty, shall be published; such accounts being first referred to a committee to prepare them for publication.

III. With the list of premiums, an account of all the medals, premiums, and bounties, which have been given by the Society the preceding year, to whom and for what purposes, shall be printed annually.

IV. In the list of the members, after the name of each member, his addition and place of abode are to be inserted.

V. The committee of correspondence are at liberty from time to time, to refer such letters as they esteem proper

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proper to the respective committees, without reporting them to the Society, in order to be referred to such committee; except such as propose the granting any new premium or bounty.

VI. All the books of the proceedings, correspondence, &c. of the Society, shall be kept in the Society's office to be inspected by members at any reasonable hour; the Housekeeper having for that end a key to the presses.

VII. Members wishing to obtain copies of papers belonging to the Society, shall give a list of such papers as they want, which lists shall be read by the Secretary.

VIII. That no book be purchased for the library of the Society, until it has been recommended by the committee most competent to judge of its merits and usefulness.

IX. No member is to be permitted to borrow from the library more than either one folio, one quarto, or two octavo or 12mo. volumes at one time; but that this liberty shall not be construed to extend to the Transactions of literary and other politic bodies, lexicons, or dictionaries, which shall on no account be lent out of the library.

No member is to be permitted to keep any book longer than fourteen days.

A book is to be provided by the Housekeeper in which the titles of the books borrowed with the name of the person borrowing the same, shall be inserted by the member who borrows such books, and when they are returned, countersigned by the Housekeeper.

That such book of the housekeeper be laid before the chairman of the Miscellaneous Committee at every meeting thereof, in order that it may be seen that the above regulations be properly attended to.

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X. No person shall be permitted to make any sketches, finished drawings, or paintings, from any statues, busts, casts, drawings, prints or pictures in the Society's possession, without leave first obtained from the Society.

XI. That the Society do not, under the notion of varnishing, touching, or on any account whatever, suffer any painter to meddle with the series of pictures in the great room.

XII. That for the better regulation of the dealings of the Society with tradesmen and others, all persons having any claims on the Society, be in future directed to send in an account of their demands once in every three months from the time of their accruing; and the committee of accounts shall at their next monthly meeting inspect such demands, and report upon them to the Society, when the bills recommended for payment, upon such recommendation being confirmed by the Society, shall be discharged at the ensuing monthly meeting of that committee, by the drafts of either of the chairmen on the Bank, countersigned by the Secretary: and that the Bank be strictly enjoined not to pay any draft which shall not be countersigned.

N. B. To persons inclinable to leave a sum of money to this Society by will, the following form is offered for that purpose:

ITEM, I give and bequeath unto A B, and C D, the sum of upon condition, and to the intent, that they or one of them, do pay the same to the collector, for the time being, of a Society in London, who now call

call themselves *The Society for the Encouragement* [illegible] *Manufactures, and Commerce*; which said sum of [illegible] I will and desire may be [illegible] of my personal estate, and applied towards carry[ing] the laudable designs of the said Society.

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(A) BALLOTING LIST.

PRESENT OFFICERS.

PRESIDENT.

Charles, Duke of Norfolk, F. R. and A. S.

VICE-PRESIDENTS.

Wm. Henry, Duke of Portland, F. R. and A. S.
Hugh, Duke of Northumberland, F. R. and A. S.
Jacob, Earl of Radnor, F. R. and A. S.
Charles, Earl of Liverpool, L. L. D.
Charles, Earl of Romney, F. R. S.
George, Earl of Dartmouth, K. G. and F. R. S.
Hon. Robert Clifford, F. R. and A. S.
Sir William Dolben, Bart. L. L. D.
Sir Robert Peel, Bart. M. P.
Sir Watkin Lewes, Knt.
Thomas Pitt, Esq. F. A. S.
Caleb Whitefoord, Esq. F. R. and A. S.
Richard Clark, Esq. Chamberlain.
Nathaniel Conant, Esq.
Richard Powell, M. D.
Thomas Rowcroft, Esq. Alderman.

SECRETARY, Charles Taylor, M. D.
ASSISTANT SECRETARY, Mr. Thomas Woodfall.
HOUSEKEEPER, Miss A. B. Cockings.
COLLECTOR, Mr. S. T. Borman.

PRESIDENT.

VICE-PRESIDENTS.

SECRETARY.
ASSISTANT SECRETARY.
HOUSEKEEPER.
COLLECTOR

[56]

PAPERS referred to.

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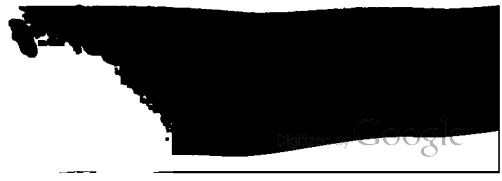
(B) BALLOTING LIST.

PRESENT CHAIRMEN.

Committtee of Accompts.	Committee of Accompts
Correspondence and Papers.	Correspondence and Pap
Polite Arts.	Polite Arts.
Agriculture.	Agriculture.
Manufactures.	Manufactures.
Mechanics.	Mechanics.
Chemistry	Chemistry.
Colonies and Trade.	Colonies and Trade.
Miscellaneous Matters.	Miscellaneous Matters.



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PAPERS

IN

AGRICULTURE.

The THANKS *of the Society were this Session voted to the Right Hon. the* EARL OF FIFE, *for the following Communication received from him relative to his Plantations.*

SIR,

I REQUEST you will lay this letter before the Society for the Encouragement of Arts, &c. as I feel it my duty to convey any information to them, respecting my plantations from the grateful sense of the honour they have done me. I have continued every year since I last wrote to the Society, to plant above one hundred acres: my plantations now, in the counties of Banff, Aberdeen, and Murray, amount to above thirteen thousand acres. I have always recommended to planters to be very sparing in pruning trees.

I have the pleasure to observe, that on the highest grounds in Duff-House Park, even where exposed to the sea, by cutting down firs and other trees, where they interfere with

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each other, that the oaks and other close-grained timber trees, rise vigorous and healthy, and will be very valuable, the oaks in particular. The silver fir and larch also grow to a great size. I was under the necessity of cutting down two silver firs and larches, where they prevented the growth of other trees; I directed them to be sawed up.—The boards of the larch have been made into tables, and are very handsome. Those of the silver fir have been used as flooring to two rooms in Delgany Castle, where the fir had decayed, and are remarkably white and finely polished. The trees in question were about forty years old.

There was a very high wind the 25th of December last, which blew down a great many trees upon my estate. Particularly a silver fir in the woods on the low grounds near Duff-House, which appeared to be well sheltered. It was planted by me in the year 1756, and had a most venerable appearance. The dimensions were as follow, as attested to me, viz.

	Ft.	In.
Length of the trunk from the surface of the ground, until divided in five limbs - - -	7	0
Girth at surface of ground - -	9	7
Girth immediately below where the limbs set off - -	8	6
The five limbs are all of the same height, except No. 1, which divides into two branches before it reaches the top. These are only a few inches shorter than the others, which are 42 feet 6 inches from where they leave the trunk, whose length is 7 feet, therefore, when added together to the height of the tree, is - - - -	49	6
No. 1. Measure of girth, where it sets off from the trunk -	5	3
And at the distance of 8 feet divides itself into two large branches.		
No. 2. Girth where it sets off from the trunk -	4	0
And at the distance of 23 feet 4 inches from starting, measures 2 feet.		
No. 3. Girth at starting - - - -	3	10

This,

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This, and the two othe
crease towards the

No. 4, Girth at starting fr
No. 5, Girth at ditto ditto

The tree alluded t
I have ordered to be
There are pineaster la
to be so fine. The ot
Little trouble is occas
I do not recommend
procure them from nu

I think seedling
moors, and this also
many may be taken
planted out the second

I raise very few Sco
men, at ten-pence per
of all the different ha
which I find answer b
nurserymen. In gen
other in their nurseries,
roots are seldom so goo
former letters.

Your m

London, Fife-house, 28th Jun

To C. TAYLOR, M
Secretary to the Society of

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The SILVER MEDAL *of the Society was this Session voted to* DAVID DAY, *Esq. of West-hill, near Rochester, for his Plantations of Ash Trees, and his interesting Remarks on the Advantages derived from them.*

In the first volume of the Society's Transactions for 1783, page 109, will be found a detailed account of the experiments which Mr. Day had made to the years 1779 and 1780 in planting Ash trees; the present account points out their subsequent management.

Mr. Day has deposited with the Society a minute account of the expenses to which the following statements refer, and which may be inspected at the Society's house.

SIR,

If you think the following information, relative to my plantations of ash trees, likely to be of advantage to the public, I wish you to lay it before the Society of Arts, &c. The Rewards I received from the Society have stimulated me to exertions in this line, and I have been very successful. I have declined all business but that of raising ash trees for my own amusement, and for improvement of the landed interest; and I flatter myself that I know it as well as any man in the kingdom. I am so certain of the success attending ash plantations, that I am willing, on landed security being given me, to advance any sum as far as thirty thousand pounds, on having the execution of such improvements under my own inspection, either jointly, or on the owner's account. I have travelled over a considerable part of England, and was sorry to see such a waste tract of land

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as Bagshot Heath, when I know it might be improved by cultivation or planting, as has really been done at Farnham, and many other commons in the kingdom. Where there are, at present, wild or uncultivated woods, I would recommend to grub up the old wood, and either put the land in tillage, or plant it properly with fresh wood, which would produce four times as much both in timber and underwood.

I have made from the underwood of some of my plantations 94*l.* per acre, at only ten years growth, and I am now falling some plantations, of which the underwood alone will produce me 150*l.* per acre, exclusive of the expense of falling. It cannot be expected that noblemen or gentlemen, brought up in expectation of possessing large estates, can have a knowledge of improvements like the executive man, and they are deterred from them by the impositions they meet with in attempting their execution. Few servants will exert themselves properly in improvements without having an interest in it themselves: But my plan is no speculation; I know from long experience it will yield an ample profit to the persons who engage in it with attention. When the plantations are once put in order, they require but little to be done afterwards, and, therefore, are good estates for parents to give their female children, as the wood will always find its value from the buyers, when ready for falling, without any trouble or expense to the owner.

I am, Sir,

Your obedient servant,

DAVID DAY.

West-hill, near Rochester, April 22, 1805.

To C. Taylor, M. D. Sec.

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Account of two acres of land in the parish of Chalk, planted with Ash, in the year 1763.

Dr.	£.	s.	d.	Cr.	£.	s.	d.
Expenses to 1766	33	0	0	By produce in 1776	42	0	0
Expenses to 1793	53	18	1	By ditto in 1783	40	0	0
Balance of profit in 1796	135	1	8	By ditto in 1793	107	0	9
£.	189	0	9	£.	189	0	9

N. B. In 1806, *the above Plantation was again fallen, and the Produce sold for* 50*l. per Acre, but it was worth considerably more. The Shoots are now in a very flourishing state.* [July, 1807.]

Account of two acres of land in Maggot's Wood.

Expenses to 1780	28	16	0	By produce in 1780	54	8	0
Expenses to 1792	30	0	0	By ditto in 1792	100	0	0
Expenses to 1799	22	3	8	By ditto in 1799	180	13	9
Balance of Profit in 1799	254	1	4				
£.	335	1	0	£.	335	1	0

N. B. It is now eight Years since the last Fall, and the Crop of Ash, in its present state, is worth 90*l. per Acre.*

Account of one and a half acre of land next Brompton Farm, in the parish of Frindsbury.

Expenses to 1783	4	16	3	By produce in 1783	42	8	0
Rent for 9 Years	10	16	0				
Expenses to 1794	20	19	9	By produce in 1794	115	19	6
Balance of profit in 1794	121	13	3				
£.	158	7	6	£.	158	7	6

N. B.

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N. B. In 1806, *was again fallen, and the Produce sold for* 30*l. per Acre, and the present Crop in an excellent state.*

Account of seven acres of land, at Longfield, in the parish of Higham.

Dr.	£.	s.	d.	Cr.	£.	s.	d.
Expenses to 1784	9	6	9	By produce in 1784	£. 180	1	6
To ten years rent	82	0	0				
Balance of profit in 1784	98	14	9				
	£. 180	1	6				

N. B. This Land has not been in my Hands since 1798, *and is now in a neglected state from bad Management, and from the Fences being broken down, and the Plants damaged by Cattle.*

Account of six acres of land at Stonefield, in the parish of Frindsbury, planted with Ash and Chesnut trees.

Expenses to 1790	4	19	0	By produce in 1790	44	8	9
To rent 14 years	67	4	0				
Expenses to 1799	35	19	0	By produce in 1799	140	5	0
Balance of profit in 1799	56	6	9				
	£. 184	8	9		£. 184	8	9

N. B. This Land has not since been in my Hands; the Chesnuts are now in a flourishing state, but the Ash much neglected.

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Account of six and a half acres of land at Frenchill, in the parish of Shorn—planted 1777.

Dr.	£.	s.	d.	Cr.	£.	s.	d.
Expenses to 1786	9	7	5	By produce in 1786	91	9	6
To rent for 9 years	46	16	0	By produce in 1799	163	2	0
Expenses to 1799	90	8	8				
Balance of profit in 1799	198	1	10				
	£. 254	11	6		£. 254	11	6

N. B. This Land is in my Possession, and the Crop in its present state is worth 50l. per Acre.

Account of a quarter of an acre of land in the parish of Shorn—planted with Ash.

Expenses to 1786	1	0	6	By produce in 1786	8	18	4
To nine years rent	1	11	6				
Expenses to 1801	10	6	10	By produce in 1801	31	16	6
Balance of profit in 1801	27	11	8				
	£. 40	10	0		£. 40	10	0

N. B. In four Years time this Crop will be worth considerably more than the last falling.

Account of five acres of land at Commonfield, in the parish of Shorn—planted with Ash in 1777.

Expenses to 1788	10	11	2	By produce in 1788	144	0	6
To 11 years rent	44	0	0				
Expenses to 1800	90	3	2	By produce in 1800	480	13	5
Balance of profit in 1800	501	2	7				
	£. 645	15	11		£. 645	15	11

N. B.

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N. B. In three Years time, this Crop will be worth than the last fall.

Account of a quarter of an acre of land, called Pom in the parish of Shorn—planted with Ash in 177

Dr.	£.	s.	d.	Cr.	£.	s.
Expenses & rent to 1789	2	0	1	By produce in 1789	1	10
Expenses to 1801	10	1	6	By produce in 1801	28	14
Balance of profit in 1801	19	14	5			
£.	32	5	0	£.	32	5

N. B, In four Years the Produce will be worth more the last Crop.

Account of eleven acres of land, called Piper's Acre the parish of Higham.

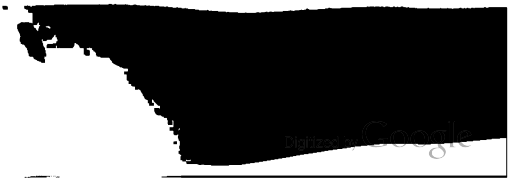
Expenses to 1790	44	18	9	Produce in 1790	72	1
Expenses to 1799	94	15	4	Produce in 1799	123	16
Balance of profits in 1799	56	8	9			
£.	195	17	10	£.	195	17

N. B. This Land is in the Hands of a Farmer Tenant, and the Plants are much damaged from the C being permitted to graze amongst them.

Account of two acres of land, called Seven Yards, in parish of Higham—planted with Ash in 1780.

Expenses to 1790	7	7	9	Produce in 1790	£. 31	7
Balance of profit in 1790	23	19	3			
£.	31	7	0			

N



N. B. This Land is not in my Hands; it afforded an excellent Crop in 1799, *and the Plants are now in a very flourishing state.*

Account of two acres of land, called Gad's Hill, in the parish of Shorn—planted in 1777.

Dr.	£.	s.	d.	Cr.	£.	s.	d.
Expenses to 1802	48	16	4	Produce in 1802	108	15	3
Balance of profit in 1802	59	18	11				
£.	108	15	3				

N. B. The present Crop is in a very flourishing condition.

Account of three quarters of an acre near my garden, in the parish of Frindsbury—planted with Ash in 1770.

Expenses to 1780	4	0	0	Produce in 1780	22	12	0
Rent ten years	6	0	0	Produce in 1798	71	14	6
Expenses to 1798	10	18	5				
Balance of profit in 1798	73	8	1				
£.	94	6	6	£.	94	6	6

N. B. July 1807. *This Crop will next Year produce more money than the former Crop.*

Account of total profits on forty-six acres one rod of land, referred to in the above statement.

Acres.	Rods.				
2	0	at Chalk	from 1763 to 1798	135	1 8
2	0	Maggots	from 1769 to 1799	254	1 4
1	2	Brompton	from 1774 to 1794	121	6 3
		Carried forward		£. 510	9 3

Acres.

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Acres.	Rods.		Brought up	£.	s.	d.
			Brought up	510	9	3
7	0	Longfield	from 1774 to 1784	88	14	9
6	0	Stonefield	from 1776 to 1799	56	6	9
6	2	French-hill	from 1777 to 1799	108	1	10
0	1	Robins's	from 1777 to 1801	27	11	2
5	0	Commonfield	from 1777 to 1800	501	2	7
0	1	Pompfield	from 1777 to 1801	19	4	5
11	0	Piper's Acre	from 1780 to 1799	56	8	9
2	0	Seven Acres	from 1780 to 1790	23	19	3
9	0	Gad's Hill	from 1777 to 1802	59	18	11
9	8	Near Garden	from 1770 to 1798	73	8	1
			£.	1525	5	9

SIR,

AGREEABLY to your request that I would furnish you with some further particulars, relative to my Ash plantations at the present period; you will find that I have added to each a N. B. with the state at the present day. I now send you some further remarks as you desired, relative to my mode of sowing the seed and managing the young plants.

Method of raising Ash Trees.

I carefully procure, from good straight well-proportioned ash trees, the ash keys, as they are commonly called, or pods, containing the seed, betwixt Christmas and the middle of February. Having, as soon as the ash keys are collected, prepared a hole in the ground, about three or four feet deep, I lay a bed of sand, a few inches deep, at the bottom of the hole; upon that I place a layer of ash keys, about two inches thick; these I cover with sand about the same thickness, to preserve the keys from heating,

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ing, and then proceed with alternate layers of the keys and sand till the hole is full. They are suffered to remain in this state till the beginning of the month of March of the following year, when they should be taken out for sowing. The keys will be found in a swelled state, ready for vegetation. The land being properly prepared, drills should be made in it as for sowing peas, and the keys laid regularly therein, and covered up with earth.

In about six weeks the young plants will appear above ground, and should be kept perfectly clear from weeds by hoeing.

In the month of March, of the next year, they should be planted out in rows, a foot wide, and the plants placed three or four inches asunder in the row. In this state they are to remain for two or three years, when they will be in a proper condition for planting out into the land, where they are to remain.

For planting out where they are to remain, the land being previously well ploughed the preceding autumn, and a good loamy soil, not too wet or stiff, the ground is to be opened by the plough, into drills about two feet apart, and the plants placed in each other drill or row, so that the rows of ash are four feet apart, and the plants in the drill two feet asunder. The drills should be 10 or 12 inches deep. A man who sets the plants, places each upright in the drill, draws the earth to it with his foot, and treads it well in. Where a plant with a larger root than common is found, the man with a small hoe or picker makes a hole within the drill, a little deeper than usual, to hold the plant, but this is not often necessary.

A statute acre will contain 5400 ash plants, and one man can plant 1000 or 1200 plants in a day.

The intermediate row between the plants may be either set

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set with beans or potatoes, or may be left open advantageously to serve as a drain to keep the young plants dry.

In the second year the plants should be stubbed or cut close to the ground with a bill; the produce serves for bavins or fire wood, and pays the expense of rent and cutting. From the stubs thus left in the ground the regular crops of ash are produced, and are fit for falling every ten years.

The ash plants are usually fallen betwixt Christmas and March, and the wood sorted into poles of three denominations; viz. best, second, and third hop-poles; besides stakes, edders, and bavins. The bavins will amply pay the expense of falling. The best hop-poles are worth, at present, forty shillings per hundred, the second quality twenty-five shillings, and the third, ten shillings. Stakes and edders are about two shillings and sixpence the hundred.

When the plants remain uncut for twelve or fourteen years, the ash plants are fit for other purposes, such as wood proper for wheelwrights, and broad hoops for coopers, besides hop-poles, &c. as before-mentioned.

When the plants have been two years in the nursery beds, and ready for planting out, they are worth from six shillings to ten shillings the hundred, according to their quality.

The ash plants I raised from 1763 to 1778, were	442484
I raised and sold from 1778 to 1807 .	156320
I have now ready for sale . . .	126096
Total of the plants I have raised	724900

I will engage, provided the land is prepared by my directions, to plant ash for one-third less money than by any other mode of cultivation yet known, and for all plants that die

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die in such a case, provided they are in new plantations, I will give plants gratis to replace them the succeeding year.

I am, Sir,
Your obedient servant,

DAVID DAY.

West-hill, near Rochester, July 31, 1807.

To C. TAYLOR, M. D. SEC.

The THANKS *of the Society were presented to Dr.* JAMES HOWISON, *for the following Communication on the Chinese Method of propagating* FRUIT TREES *by Abscission.*

The following Accounts were received from him, and an explanatory Engraving of the Method is annexed.

SIR,

THE Chinese, in place of raising fruit trees from seeds or from grafts, as is the custom in Europe, have adopted the following method of increasing them.

They select a tree of that species which they wish to propagate, and fix upon such a branch as will least hurt or disfigure the tree by its removal.

Round this branch, and as near as they can conveniently to its junction with the trunk, they wind a rope, made of straw, besmeared with cow dung, until a ball is formed, five or six times the diameter of the branch. This is intended as a bed into which the young roots may shoot. Having performed this part of the operation, they immediately under the ball divide the bark down to the wood, for nearly two-thirds of the circumference of the branch. A cocoa-nut shell or small pot is then hung over the ball, with

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Mr. I. Broad's
Timber Gauge.

Chinese Method of propagating
Fruit Trees by Absasion.

Pl. I.

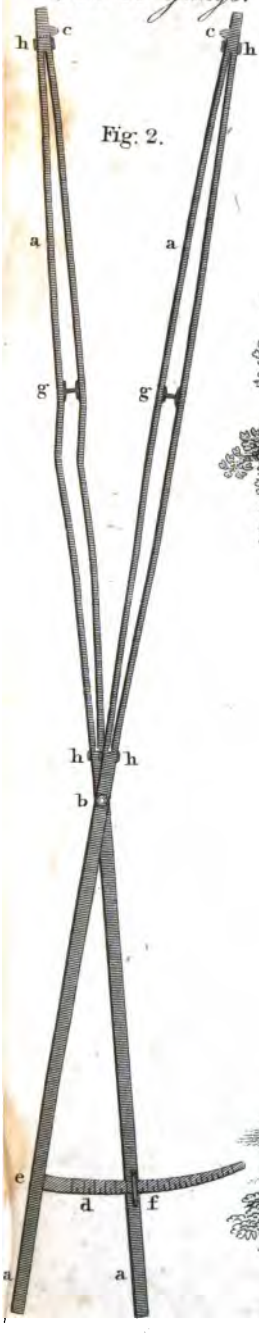

Fig: 2.

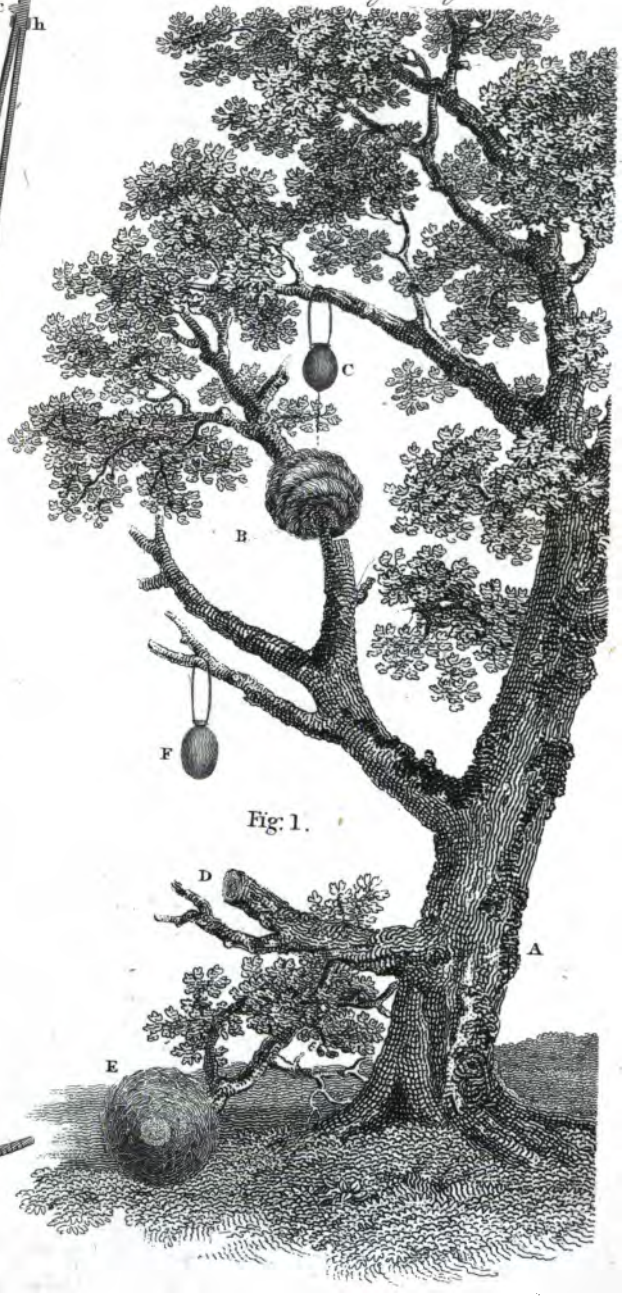

Fig: 1.

C. Varley del.

Miss M. Ogilvy del.

S. Porter sculp.

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with a hole in its botton
will only fall in drops; t
moist, a circumstance n
the young roots, and t
the branch from this n

During three succeed
quired, except supplyin
expiration of that period
cut, and the former inci
into the wood, as by th
roots have struck into th
ance in support of the b

After a similar period
in about two months fro
cess, the roots may ge
other on the surface of t
are sufficiently advanced
branch from the tree. T
the incision, care being t
time is nearly rotten, is
The branch is then plante

It appears probable, th
in Europe, a longer period
being much slower in Eur
of my experiments. I
some trials which I have
an additional month would
deficiency of climate.

The advantages to be de
a further growth of three
the branches are of any co
their full bearing state, wh

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years are necessary with most kinds of fruit trees, if raised from the seed.

When at Prince of Wales's Island, I had an opportunity of seeing this proved by experiment. Some orange trees had been raised by a gentleman, from seeds sown in 1786, which had not borne fruit in 1795, while branches taken off by the Chinese mode in 1791, had produced two plentiful crops.

Whether forest trees might be propagated in Europe in the same manner, I have not had experience sufficient to form a judgment: if it should be found practicable, the advantages from it would be great, as the infancy of trees would, by this means, be done away, a period which, from the slowness of their growth, and the accidents to which they are liable, is the most discouraging to planters.

The adoption of this method will, at all events, be of great use in multiplying such plants as are natives of warmer climates, the seeds of which do not arrive here at sufficient maturity to render them prolific.

I have frequently remarked that such branches of fruit trees as were under the operation of abscission, during the time of bearing, were more laden with fruit than any other part of the tree. It appeared to me probable, that this arose from a plethora or fulness, occasioned by the communication between the trunk and branches, through the descending vessels being cut off by the division of the back, while that by the ligneous circles or ascending vessels, being deeper seated, remains*. The same reasoning accounts for fruit trees producing a greater crop than usual, on being stripped of their leaves, most of the ascending juices being

* The circumstances attending the Chinese method of propagating fruit trees, appear a strong confirmation of Mr. Bonnet's opinion, that plants as well as animals have a regular circulation of their fluids.

thrown

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thrown off by them in perspiration, or expended in nourishment, for we find that bleeding trees cease to out their juices after they have put forth their leaves *

I have observed that the roots from a branch und operation of abscission, were uniformly much long shooting into the rope when the tree was in leaf, tha contrary, hence, the spring season appears most prop performing that operation.

It will seem singular that the Chinese entertain the opinion that Linnæus did, respecting the pith of tree ing essential to the formation of the seed. By cutting the trunk of the guava tree before it has produced, making a division in the pith, they have obtained fruit out seed.

I am, Sir,

Your obedient Servant,

JAMES HOWISON

London, June 4, 1806.

To CHARLES TAYLOR, M. D. SEC.

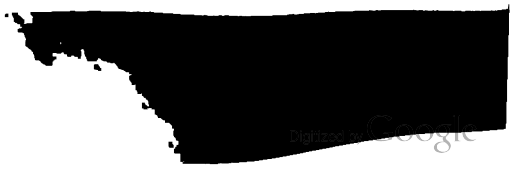
Reference to the Engraving, Plate I, *Fig.* 1, *of the Chi Method of propagating Fruit Trees by Abscission.*

A. The tree on which the operation is performed.

B. The straw rope wound in a ball round a branch of tree.

C. The cocoa-nut shell or vessel, containing the wat which gradually drops from thence on the ball below it.

* Marsden, in his History of Sumatra, page 119, says, "The nati when they would force a tree that is backward to produce fruit, strip it o leaves, by which means the nutritive juices are reserved for that impor use, and the blossoms soon show themselves in abundance.



D. Another branch of the same tree from which the part E roosted in the straw rope or ball, and now ready for planting out, has been separated.

F. The vessel suspended from a branch above, and from which the ball had been supplied with water.

The SILVER MEDAL *was this Session voted to Mr.* JAMES BROAD, *of Downing Street, for his Invention of a Gauge or Measure for Timber.*

The following Communication was received from him; an Engraving of the Instrument is annexed, and a Model thereof is placed in the Society's Repository.

SIR,

THE Instrument I send herewith, is for finding the girth of standing timber, and will, I flatter myself, be found exceedingly useful to all gentlemen, and others having timber to dispose of, and likewise to such purchasers as wish to pay for the true quantity. At present a gentleman having timber to dispose of, is liable to be imposed on to a very large amount, for though some surveyors may be found whose eye is pretty accurate, yet that is far from being generally the case. When an estate is sold on which the timber is to be valued, I believe, there is no other way in general use of finding the girth of a tree (which being squared and multiplied by its length, gives the contents) than by actually getting up to the middle, where the girth is usually taken, with a ladder or otherwise: a method which is very troublesome and expensive where the quantity is large. The seller has, therefore, no way, but at an enormous expense, of finding the real contents of what he has

to

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to offer, and as the buyer, if a dealer from his knowledge is able to form a more accurate judgment, it often happen that the seller sustains much loss. *I have known it exceed 50 per cent.* Having some time ago a large quantity to survey, I thought it possible to invent an instrumen which would obviate this inconvenience, and which migh be sold at a low price, be correct in its work, quick in execution, and such as any capacity might use. I likewise thought it might be so contrived as to make such an allowance for bark, as should be agreed on. The instrument I send you possesses all these qualifications, and is susceptible of several improvements, of which I was not aware when I made it, which I will point out at the end of my letter.

It is well known that the diameter and circumference of circles, are in a certain proportion to each other, and that double the diameter gives double the circumference. The allowance for bark is usually one inch in thirteen, that is, if the greater circumference of a tree with the bark on, is found to be thirteen inches, it is supposed it would be only 12 inches if the bark was taken off.

The instrument is composed of two straight pieces of well seasoned deal, about thirteen feet long, joined together by a pin going through them, on which they are moveable, but neither the length nor thickness are of any particular consequence, as by following the directions hereafter given, they may be made of any size. A little way from the larger end is a brass limb, I call the index, on which are engraven figures denoting the quarter-girth in feet and inches. To use this instrument, it is only necessary to take hold of the large end, and apply the other to that part of the tree where you wish to know the girth, opening it so wide as just to touch at the same time both sides of it, without straining it, keeping the graduated side of the index uppermost, on

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which the greater girth will be shown, after allowing for the bark, by the inner edge of the brass on the right hand leg. An operation so easy and simple, that a person of the meanest capacity might measure a great number of trees in a day.

For taking the height of a tree, I would recommend deal rods of seven feet long, made so as to fit into ferrils at the end of each other, tapering all the way in the same manner as a fishing rod. A set of five of them with feet marked on them, would enable a man quickly to measure a tree of more than forty feet high, as he would be able to reach himself about seven feet.

The improvements it is capable of, are, making a joint in the arch or scale, to enable it to shut up (when the legs are closed) towards the centre, which would make it easier to carry. Secondly, as it sometimes happens that standing timber is sold without any allowance for bark, and at other times with a less allowance than one inch in thirteen, two other scales on the index might be added in such cases, one without any allowance, and the other to allow as might be agreed on. I would have added these, but thought the Society would rather see it in the state in which it has been tried on a large survey, as any artist can with great ease add whatever scale he pleases. The present scale allows one inch in thirteen for bark, and is calculated on the following data. The diameter of a circle whose quarter circumference is 26 inches, is 33 $\frac{90}{100}$ inches. The diameter of a circle whose quarter girth is 6½ inches, is 8 $\frac{27}{100}$ inches. To graduate the scale, the instrument is opened so as to take in at the small end between the touching points 8 $\frac{27}{100}$ inches, and a mark is made on the arch to denote 6 inches quarter girth: it is then opened so as to take in 33 $\frac{95}{100}$ inches, and another mark is then made on the arch, to denote two feet quarter girth;

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girth; (these marks are made close to the inner edge of the brass on the right hand limb): the space between them is then divided into eighteen parts, which represent inches, and are again divided into half, for half inches; if any notice is to be taken of quarter inches, the eye will easily make a further decision.

I beg leave to add, that it is not my intention to make any for sale.

I am, Sir,
Your obedient Servant,
JAMES BROAD.

Reference to the Engraving of Mr. James Broad's Machine for measuring standing Timber. Plate I, *Fig.* 2.

Fig. 2. *a a a a* Two long pieces of well-seasoned wood, joined near the middle by a pin *b* going through them, forming an axis on which they move. *c c* Two pieces of brass screwed near their upper ends, on the sides opposite to each other, and projecting over to form the measuring points. *d* The index fastened to one of the pieces of wood at *e*, and moving freely under a small bar at *f*. *g g* Screws with nuts, placed in the middle of the long slits of the two arms, to wedge them open, whereby the vibration is destroyed, and the arms, though light, are rendered stiff. *h h h h* Screws and nuts to prevent the arms from splitting.

No. 12, *Downing Street, Dec.* 8, 1806.
To CHARLES TAYLOR, M. D. SEC.

A Certificate from Mr. J. WILKINS, carpenter, of Sandy Lane, dated May 4, 1805, stated, that he had used the instrument invented by Mr. J. Broad, for measuring timber standing, and that he believes it to be a correct and valuable one.

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The Sum of TEN GUINEAS *was this Session voted to Mr.* RICHARD DREW, *of Great Ormond Street, for a* BALANCE LEVEL, *useful for laying out Land for Irrigation, for Roads, and other Purposes.*

The following Communication was received from him; an Engraving is annexed, and the Instrument is placed in the Society's Repository.

SIR,

HEREWITH you will receive a Balance Level, of my invention, which I have satisfactorily used on several gentlemen's estates in Devonshire, where I have been employed to drain and carry water to irrigate meadow land. I have made several for persons in that county, whose employment is to drain and irrigate land, and they have found it to answer their purpose better than the spirit or water level, it being more portable and ready to the sight.

I have lately used it on Mr. Satterley's farm, at Hastings, to carry the water of his closes over several acres of dry ground. Dr. De Salis, who has seen it, advised me to send it to the Society of Arts, &c. that they might judge of its merits.

I am, Sir,
Your obedient Servant,
RICHARD DREW.

London, Dec. 5, 1804.

To the Secretary of the Society
of Arts, &c.

Explanation

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Explanation of the Method of using the Instrument.

Set it on a triangular staff, and point it at the object staff, which is held by another person at a distance; move the level on the joint, until the inner tube plays clear within the outer tube. Look through the sights, and observe the object staff which the person holds, let him move the slide on the staff until you see the hair cut the middle of the slide, on which there is a black line, then turn the level round, and look through the sights, you will then see if the hair cuts the middle of the slide as before, which, if it does, it will be level, but if there be a difference in both ends, the person who holds the staff must set the slide to half that difference. You are then to adjust the level by turning with a key the screw which moves the balance contained in the bottom of the inner tube.

Certificates from Mr. J. W. Gooch, Mr. Charles Layton, and Mr. Benj. Holmes, testify that they have seen in use the level invented by Mr. Richard Drew, and that the business is done by it with accuracy and dispatch.

Reference to the Engraving of Mr. Richard Drew's Balance Level. Plate II, *Fig.* 1, 2, 3, 4.

Fig. 1. The balance level, mounted on a ball and socket joint, with a tube, *a*, to fix on a stand.

Fig. 2. A section, *b b c c* two tubes of tin which slide on a short tube, *d d*, placed in the middle, and having an iron wire soldered round it to stiffen it, and to serve as a shoulder.

e e Two eye pieces, with glass in both, one at each end, and sliding into the tubes *b* and *c*.

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f f The balance level, hanging by a sort of staple *g*, on a point fixed upright on the middle of the bar *h* (shown in Fig. 3), which is fastened across the tube *d*.

i i Two eye pieces sliding into the ends of the level *f f*, and having a narrow slit horizontally across the middle, with a hair before each, shown by the dots *h h*.

k An adjusting screw, which acts by drawing the piece *m*, (which moves in a dove-tail slide), in one end of the tube:

n The key-hole through which the screw is turned.

Fig. 4. An end view of the case and level, showing the eye pieces *i* and *e*, one within the other.

The SILVER MEDAL *of the Society was this Session voted to Mrs.* HANNAH D'OYLEY, *of Sion Hill, near Northallerton, Yorkshire, for a new Method of rearing Poultry to Advantage.*

ENGRAVINGS *of the Apparatus are annexed, and the following Accounts were received from her.*

SIR,

I BEG leave to communicate a most desirable method of rearing poultry, which I have proved by experience; the economy and facility with which it may be performed, would, if generally adopted, lower the price of butchers' meat, and thereby be of essential benefit to the community at large. I keep a large stock of poultry, which are regularly fed in a morning upon steamed potatoes chopped small, and at noon they have barley; they are in high condition, tractable, and lay a very great quantity of eggs.

In

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In the poultry yard is a small building, similar to a pigeon cote, for the hens to lay in, with frames covered with net to slide before each nest; the house is dry, light, and well ventilated, kept free from dirt by having the nests and walls white-washed two or three times a year, and the floor covered once a week with fresh ashes: when I wish to procure chickens, I take the opportunity of setting many hens together, confining each to her respective nest; a boy attends morning and evening to let any off that appear restless, and to see that they return to their proper places: when they hatch, the chickens are taken away, and a second lot of eggs allowed them to set again, by which means they produce as numerous a brood as before: I put the chickens into long wicker cages, placed against a hot wall at the back of the kitchen fire, and within them have artificial mothers for the chickens to run under; they are made similar to those described by Monsieur Reaumur, in "his *Art de faire eclore et d'elever en toutes Saisons des Oiseaux domestiques de toutes especes*," &c. in two volumes, printed at Paris, 1751: they are made of boards about ten inches broad, and fifteen inches long, supported by two feet in the front, four inches in height, and by a board at the back two inches in height. The roof and back are lined with lamb's skins dressed with the wool upon them. The roof is thickly perforated with holes for the heated air to escape; they are formed without bottoms, and have a flannel curtain in front and at the ends for the chickens to run under, which they do apparently by instinct. The cages are kept perfectly dry and clean with sand or moss. The above is a proper size for fifty or sixty new hatched chickens, but as they increase in size, they of course require a larger mother. When they are a week old, and the weather fine, the boy carries them and their artificial mother to the grass-plot, nourishes and keeps

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to the main deposit. It would have given me great pleasure to have been able to send a specimen of my superior feed and management, if the season had been rather more advanced, for I think it is not possible for turkies and chickens to weigh heavier, be whiter, or altogether better fed than mine are.

After a certain age, they are allowed their liberty, living chiefly on steamed potatoes, and being situated tolerably secure from the depredations of men and foxes, are permitted to roost in trees near the house.

I have the honour to be, Sir,

Your most obedient Servant,

HANNAH D'OYLEY.

Sion-hill, near Northallerton, May 11, 1807.

SIR,

ACCORDING to your request, I herewith send you a rough sketch of the apparatus I use, which probably will convey an idea of the business, and not be too complicated for persons employed in poultry yards, fully to understand; but to prevent trouble and prejudice in the first outset, I think it necessary to remark, that if the chickens do not readily run under the artificial mother for want of some educated ones to teach them, it will be proper to have the curtain in front made of rabbit or hare skin, with the fur side outwards, for the warmth and comfort to attract them, afterwards they run under the flannel ones, similar to the one I sent, which are preferable for common use, on account of cleanliness, and not being liable to get into the mouths of the chickens.

I have had great amusement in rearing poultry in the above way, and if my time was not occupied with my children

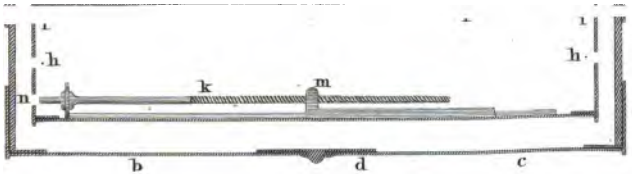

Fig: 7.

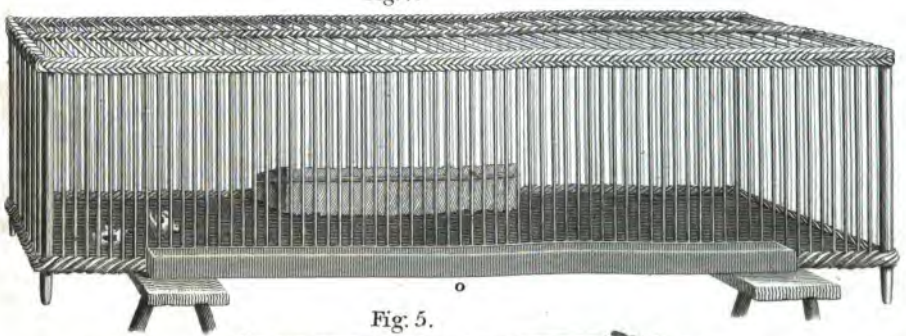

Fig: 5.

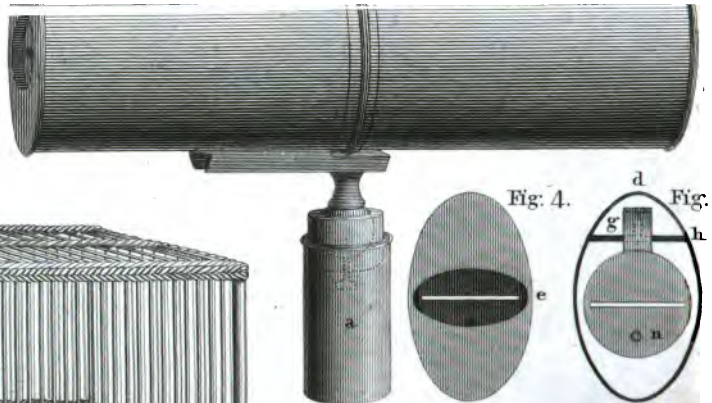

Fig: 4.

Fig: 3.

Fig: 6.

Mrs D'Oyley's Method of rearing Poultry.

C. Varley sc.

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dren and other family concerns, I should most assuredly farm very largely in poultry.

I have the honour to be, Sir,
Your most obedient Servant,
HANNAH D'OYLEY.

Sion-hill, May 20, 1807.

To CHARLES TAYLOR, M. D. SEC.

Reference to the ENGRAVINGS *of Mrs. D'Oyley's Method of breeding Poultry.* Plate II. Fig. 5, 6, 7.

Fig. 5. The Apparatus called the Artificial Mother, with a curtain of green baize in front and ends, and holes through the top to allow the circulation of air.

Fig. 6. Another view of the artificial Mother, but without the curtain, in order to show its sloping direction, and interior lining of woolly sheep-skin.

Fig. 7. A wicker basket four feet long, two feet broad, and fourteen inches high, with a lid to open, and a wooden sliding bottom similar to a bird cage: the Artificial Mother is shown, as placed within it.

O. A Trough in front to hold food for the Chickens.

The SILVER MEDAL *of the Society was this Session voted to Major* SPENCER COCHRANE, *of Muirfield House, near Haddington, North Britain, for the Culture of Spring Wheat, and the Use of Tincture of Opium in the Diseases of Cattle.*

On Spring Wheat.

SIR,

I REQUEST the favour that you will present my thanks to the Society of Arts, &c. for transmitting me the 20th volume of their Transactions, containing my former experiments

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ments on the culture of wheat sown in the spring. I have since had further proofs of the advantage resulting from that practice.

Notwithstanding the extreme cold weather, which we had here during the months of March, April, and May, I never saw my spring wheat look better, particularly four acres, part of a field of strong clay, which I was prevented from sowing in October, when I sowed my other wheat, by wet weather commencing.

The whole field consists of twenty acres, and received one ploughing after drilled beans. I sowed on the 14th of March the four acres, with four bolls or two quarters of common wheat, on the same earth or furrow which the land got in the month of October.

In the event of land having been fallowed and sufficiently cleaned before winter, and wet weather setting in so as to prevent wheat being sown at the usual time, I recommend from experience that the wheat be sown in the spring on the winter furrow, and that it should by no means be ploughed again in the spring.

The winter frost meliorates the soil, and I think kills the annual weeds. I have remarked that by adopting this mode, the land is much less troubled with them; the weeds having been a general objection to spring wheat.

If spring wheat follows turnips, the ground should be ploughed as soon as possible, if the soil is of a wet nature, to correct the injury the land may have sustained by leading off the crop, and by the poaching of carts and horses. Frost will in some degree correct what should never if possible happen, *wet ploughing*.

From the middle of February till the 10th of March is the proper time for sowing wheat in the spring, provided the land is sufficiently dry. Then on the first furrow let the seed

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seed properly pickled be sown either by drill or broad cast, the usual practice of water furrowing, to keep the land from too much rain, being properly attended to.

On the Use of Tar for Cattle swelled by eating Clover.

Cows are frequently seized with violent swellings from having been imprudently allowed to eat clover when wet. A gentleman recommended to me, as a cure, an egg-shell full of tar, immediately to be put down the creature's throat. In two instances of my own cattle I found it had the effect of laying the swelling in a few minutes. A neighbour of mine whose cow was supposed could not live five minutes, was, on application of the tar, unexpectedly recovered, to the great joy of the poor man.

On Opium and other Preparations from Poppies.

After I commenced farmer, I unfortunately lost four horses, by a disorder, very frequent in this country, called the *bats* or *gripes*; some of them died in a few hours, and none of them were ill more than two days. For some years past I have given my horses in such cases a table spoonful of tincture of opium, or liquid laudanum, and have since lost none. If the first dose given in some liquid does not allay the violent pain and swelling, I administer a second spoonful, which I have hitherto, in all cases, found to have the desired effect, and generally in a very short time.

If I find the horse very hot and feverish, and sweating profusely, as is usually the case in this disease, I order him to be bled plentifully, and an ounce or more of nitre to be mixed,

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mixed, and administered with the laudanum, keeping the horse warm, and letting him be well rubbed round the belly.

A very considerable farmer near me, who has had a medical education, told me, a few days ago, that he had not lost a horse since he gave them laudanum.

Ten days ago I was equally fortunate in a trial of it on one of my sheep, which, half an hour after being washed with the rest of the flock, was taken so extremely ill, and swelled so much, that my herdsman supposed she could not live, having lost some of his own, which had apparently been in the same state. I immediately ordered half a handful of common salt to be dissolved in half an English pint of warm water, into which I put sixty drops of the laudanum, and poured it with difficulty down the animal's throat, which seemed nearly dead. For the first five minutes I had so little hopes of the sheep's recovery, that I ordered the man to get his knife ready to cut her throat; whilst he sharpened the instrument for such purpose, he observed the animal to move its jaw to a proper position, which had previously been much distorted; the eyes then began to quicken, and apparently to become at ease. In half an hour afterwards the sheep got on her legs, and remained standing for some time; a plentiful evacution soon took place, the swelling subsided, she continued to recover, and in a few hours from the first attack began to eat and do well.

My intent in these communications is to render generally public what I have found so very beneficial. At this time, when horses and cattle are so extremely high in price, every thing that can tend to preserve their lives, should be made known and put to trial.

I formerly noticed to you, that I had tried on a small scale, for several years, the culture of white poppies to prepare

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prepare opium from them, and an extract or syrup of po pies; that I had raised a sufficient supply for myself a friends, and that my extract was equal in effect to any pr pared from foreign opium. I recommend the poppy see to be sown in March, in drills.

Besides the advantages from the poppy heads as a med cine, the seeds yield a valuable oil. Two pounds of t seeds furnish by expression seven ounces of a pure blan oil, useful for portrait painting and other purposes. It h been proved in Holland to be equal in quality to fine sala or olive oil, and it would probably be advantageous to pro pagate largely so valuable a plant.

I am, Sir,
Your humble Servant,
SPENCER COCHRANE

Muirfield House.

To C. Taylor, M. D. Sec.

SIR,

Since my former communication I have had frequent op portunities of being fully convinced of the efficacy of lau danum, when applied in proper time, for the cure of th cholic in horses. When inflammation has taken place which sometimes comes on very rapidly, its application wil be too late. A few days since two of my draught horse were taken ill, one in the morning, the other in the evening I believe the disorder originated from their having bee allowed to drink too much water when warm. By using th laudanum in the manner I have recommended they both recovered, and were at their work again within twenty four hours. I grow the poppy, extract the opium from th heads, infuse it in spirits or brandy agreeably to the pre

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scription in the Dispensatory, and thus prepare the laudanum myself, instead of purchasing it at the apothecary's. I consider my opium to be pure and unadulterated, and of course stronger, and more efficacious.

I have cured many persons of colds and coughs of long standing, by the following preparation or syrup.

Take half a pound of the heads of the large white poppy without any of the seeds, the heads just ripe and moderately dried, put them into three quarts of boiling water, let them boil gently, till the liquor is reduced to one quart, squeeze the poppies well in a cloth to strain out the liquor, boil the liquor again slowly to one pint and strain it, then add to it a pint of white wine vinegar, and one pound of raw sugar, let them boil gently to the consistence of a syrup, then add thereto spirit or elixir of vitriol to make it gratefully acid. The dose I have recommended for adults is one or two tea-spoonfuls, but never exceeding three, on going to bed. If the cough continues violent, two more may be taken the following morning. One dose sometimes cures, two generally, and I have never had occasion to employ it more than thrice. For young children one tea-spoonful is sufficient.

I recommended the use of this medicine to a surgeon in Haddington, and he told me it answered beyond his expectation.

I am, Sir,

Your obedient Servant.

SPENCER COCHRANE.

Muirfield, near Haddington, May 7, 1807.

To C. Taylor, M. D. Sec.

PAPERS

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C.]

THE following
Right Hon. Lo
Yorkshire, respec
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Samples of th
Society's Reposito

SIR,

HEREWITH I
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comes equal in colour by time to the best white lead, and for durability, for never blistering, and for body and adhesion infinitely superior to it.

If the specimen (which is the average of what may be ordinarily obtained, although for particular purposes it may be produced much finer), should meet with the approbation of the Society of Arts, &c. I shall at any time, with the greatest pleasure, at their request, render them all the information upon the subject in my power. I have painted four or five years ago a vessel which is now in his Majesty's service, with this paint, and nothing can exceed the resistance which this paint makes to all the effects of salt water to decompose it.

I have the honor to be, with much respect,

Sir,

Your obedient humble Servant,

RIBBLESDALE.

Clarges-Street, March 19, 1808.

To C. Taylor, M.D. Sec.

Additional Communication by Lord Ribblesdale, on his Ore of Zinc.

The mines are situated at Mallam Moors, in Craven, Yorkshire, and in an extent of country of eleven or twelve thousand acres of land belonging to his Lordship; where the mineral is found, there were formerly copper mines.

This article is found in caverns, about eight fathoms from the surface of the earth, the mineral lies in strata, along the bottoms of these caverns, which strata are from three to

to six feet thick, and the best coloured mineral, or whitest, lies the lowest. On the upper part of the caverns are beautiful stalactites of great hardness.

One of the caverns wherein it is found is one hundred and four yards, another forty-four, and a third eighty-four yards in length, and about fourteen yards wide.

His Lordship supposes this mineral has been sublimed by a volcano, as the stones surrounding it have been vitrified.

The mineral was first tried as a paint twelve years ago; it was previously sold, and continues to be sold to make brass at Birmingham and other places. He has sold upwards of two thousand tons, at from five to ten pounds per ton, for making brass, when mixed with copper.

His Lordship stated, that it has answered well for house painting externally, and the whiteness improves by time; that it will in painting cover a much larger surface than white lead paint, and he supposes it will do half as much more work; that it forms a body on the wood so hard as to resist the edge of an adze; and that it forms a strong cement betwixt two boards painted with it.

That it will never peel off; that the oil paint on palings withstands the effect of moisture; and that it will mix as a basis with all other colours.

His Lordship added, that the price will not exceed that of white lead, but, on the contrary, thinks, that except in the finest preparations, upon an average it will come considerably lower.

March 29, 1806.

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DEAR SIR,

PERMIT me again to assure the Society, that the body of my paint is equal to white lead, and that the ore itself is so pure, and is found in the mine so little mingled with any other substance, that I do not lose two pounds of the colour in a ton of the ore.

I remain, Dear Sir,
Your very humble servant,
RIBBLESDALE.

London Hotel, Albemarle-Street,
June 22d, 1807.

To C. TAYLOR, M. D. SEC.

TEN GUINEAS *were this Session voted to Mr.* EDMUND TURRELL, *No. 40, Rawstorne-Street, Goswell-Street Road, for his improved Mode of constructing Muffles for Chemical Purposes.*

The following Communications were received from him, and an Explanatory Engraving is annexed. Models of the Implements employed are placed in the Society's Repository.

MY LORDS AND GENTLEMEN,

HAVING experienced much inconvenience in the common mode of moulding muffles on wooden blocks, for the use of chemists, enamellers, &c. I beg leave to lay before your praise-worthy Society, an improved method, possessing the following advantages: namely,

First, By this new method of moulding muffles, coarser and cheaper materials may be used than can be employed in

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in the common mode; and which also gives them the valuable property of resisting a greater degree of heat.

Secondly, That much time will be saved by this improved method of manufacturing them, must be allowed, when the two modes are compared.

Thirdly, The certainty of making them without cracks or flaws, and with coarser materials, will appear obvious, when it is considered, that by this improved method, they are *internally* moulded instead of *externally*; by which means the strength of the operator may have its full effect, in firmly compressing the composition into the mould.

Whereas, in the old mode, the workman, after having spread the composition upon a cloth, guessing at its thickness, bends it over the block in the best way he can, and by thus disturbing the composition, he must needs make many cracks and flaws, which can be but imperfectly closed in smoothing the surface of the muffle, whilst upon the block; the evil consequence attending which is, its being subject to fly or crack when exposed to a great heat; and it will also be plainly seen, that, in the old mode, a great disadvantage is felt by the sides of the muffle, whilst in its wet state, hanging from its centre, and which also tends to crack it, as there can be nothing applied to assist it in this case, but by employing a greater proportion of cohesive clay in the composition, which, however, produces little if any advantage; whereas in the mode which I have invented, this fault is entirely obviated, and the composition, by its contraction in drying, assists the extrication of the muffle from the mould.

Fourthly, With respect to simplicity, this new mode will be found to possess a very great advantage, for a boy of twelve years of age may be taught to make them in a very short time.

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The fifth advantage in this improvement, and of equal consideration, is the cheapness of the article; the price of which has been reduced nearly one-third to the consumer; and when the superior quality of them is taken into consideration, it may fairly be said to be full one-half. I mean, when regard is had to their superior quality; and that the muffles may be used over again when broken and ground, with a much less proportion of cohesive clay than in the old mode; and this I conceive to be no inconsiderable advantage; for it is well known, that when the old muffles or broken crucibles can be used without much fresh clay, they are far superior to new materials.

Sixthly, The muffles made in the old way are seldom of equal thickness; whereas those made according to the method which I have the honor to present before the Society, will be found to possess that necessary quality in perfection; for, if an hundred are made from the same mould, they will be all of the same thickness.

Description of the Moulds and Implements.

The first mould for this purpose is a tin one, Fig. 1, which may be made from a piece of tin the size of the arch, being bent so as to form such a concavity as may best suit the purpose to which it is to be applied; this being done, two square pieces of tin, *a a*, must have an arch cut out of them, of such a size that the diameter thereof may be about three-fourths of an inch less than the diameter of the concave piece before stated; these being soldered to each end of the first-mentioned piece, will form a stand for the hollow part of the mould, and the thickness of the muffle moulded in this will be exactly determined by the edge at

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at each end. A piece of hollow tin, *b b*, may be soldered along the top edge of the mould, to form a better resistance to the great pressure within. The next part of this mould is a flat piece of tin, Fig. 2, cut exactly to fit the inside of the mould, the use of which is, to form a solid back to the muffles used for chemical purposes.

The second tool for this purpose is a piece of sheet brass, Fig. 3, about six inches long and one broad, which being bent in a semicircular form, and screwed to a piece of wood extending beyond its breadth about an inch, is used for cutting the small air holes *c* (Fig. 11), in the aforesaid muffles.

The third is the tool or frame, Fig. 4, for preventing the contraction of the muffles in drying, which is made of four pieces of beech, about three quarters of an inch broad, and half an inch thick; the length must be adjusted to the mould of the muffle; two of these being laid parallel within the inside of the mould, and being joined across by the other two, the ends of which should extend so far beyond the outer edges of the other two, that they may rest upon the edges of the muffle mould, and thereby prevent its falling into the mould.

The fourth is the tool for spreading the composition into the moulds, which is formed of iron or steel, (Fig. 5), about thirteen inches in length, one inch and a half broad, and about one-eighth thick; its face under *h* being rounded in such a manner that its curve may exactly fit the inner curve of the muffle mould (Fig. 6, is a section of it); this should likewise have a point or tongue, extending from each end, long enough to be bent in the form of a bricklayer's trowel, and by the wooden handles which must be put on, hanging down, it will be found, that, as it is moved either backwards or forwards, it will always present an edge to smooth the composition, and condense it in the mould.

The

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The fifth is a frame (*d d*), Fig. 15, of which the bottom and farthest side only are shown, and in which frame the tin mould, Fig. 1, is placed, simply constructed by joining two pieces of wood, the one as broad as the bottom of the muffle mould, and having two narrow groves (*e e*), cut in it, so that the edges of the tin mould may be confined therein; the other board being joined to this, at its edge, should come up so high as just to be under the edge of the mould.

The sixth is the tool for cutting the muffles of different lengths (Fig. 7), and is made of a piece of wood, to the end of which is fixed a thin piece of brass (*f*), which extending about one inch and one-fourth beyond the top of the wood, is bent at right angles, and made thinner at the end, that it may the more conveniently cut the muffle; under this piece of wood is used another straight piece (*g*), with two steady pins, which being shifted at the will of the workman, will cut them of any length.

The seventh is the mould for forming the bottom of the close muffle (Fig. 8), which is made of a mahogany or oak plank, about sixteen inches long, ten wide, and about three-eighths of an inch thick; upon this is fixed a ledge on each side, one inch broad, and nearly half an inch thick, and at each end a ledge of the same kind is placed, at such a distance as is best suited to the length of the bottom required. Fig. 9 and 10, are circular moulds for muffle bottoms of dial plates. Fig. 11, a complete muffle standing on its bottom. Fig. 12, a roller for rolling the composition in the first mould. Fig. 13, a tool for making small holes in the muffle.

The usual composition for making muffles is as follows: viz. two parts pipe clay and one part sand, such as is used by the bricklayers, sifted, and mixed together to a proper consistence; this is very expensive, on account of the high price

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price of pipe clay, which
weight, whereas I emplo
them the coarser kind of S
at the glass-houses, in th
hundred weight, and this
part, which I employ for
cessary in my business;
part for muffles, to which
clay, mixing them well t
a mass of a pretty thick c
first greased, I place it i
Fig. 1. and having spread
smoothed it with the spr
full, the flat piece of tin
thrust in at one end of
muffle is then formed b
firmly pressing it against
thing to be done is to cu
fle, which is done by pres
into the sides thereof, wh
piece out entire: the tin
Fig. 4. put in. to keep t
tracting, and being set u
it must be dried in the s
ly to leave the mould, s
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The composition of th
bottoms for dial plates,
made of the finer part of
proportion of pipe clay.

The rings are made fr
pots, powdered, and one
repeated trials of Englis

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a substitute for the Dutch black lead pots, but without finding it to answer properly.

Should any difficulty appear in any part of my process, I shall be happy in attending the Committees, and performing the whole operation before them, whenever they shall be pleased to appoint, when the great simplicity and advantage will appear evident.

I am,

My Lords and Gentlemen,

Your most obedient and respectful Servant,

EDMUND TURRELL.

No. 40, Westmoreland Street, Goswell Road,
April 10, 1806.

To the Members of the Society of Arts, &c.

Certificates from Messrs. J. HAYNES and SON, Westmoreland Buildings; JOHN KELLY, Hooper-Street, Clerkenwell; JOHN FOSTER, Author-Street, St. Luke's, and WILLIAM FOSTER, Author-Street, St. Luke's, state, that they have been in the habit of using for upwards of twelve months, Mr. Turrell's muffles, and that they are greatly superior to any they have hitherto been able to procure, and that it is their opinion their durability may be completely attributed to his improved method of moulding them.

PAPER

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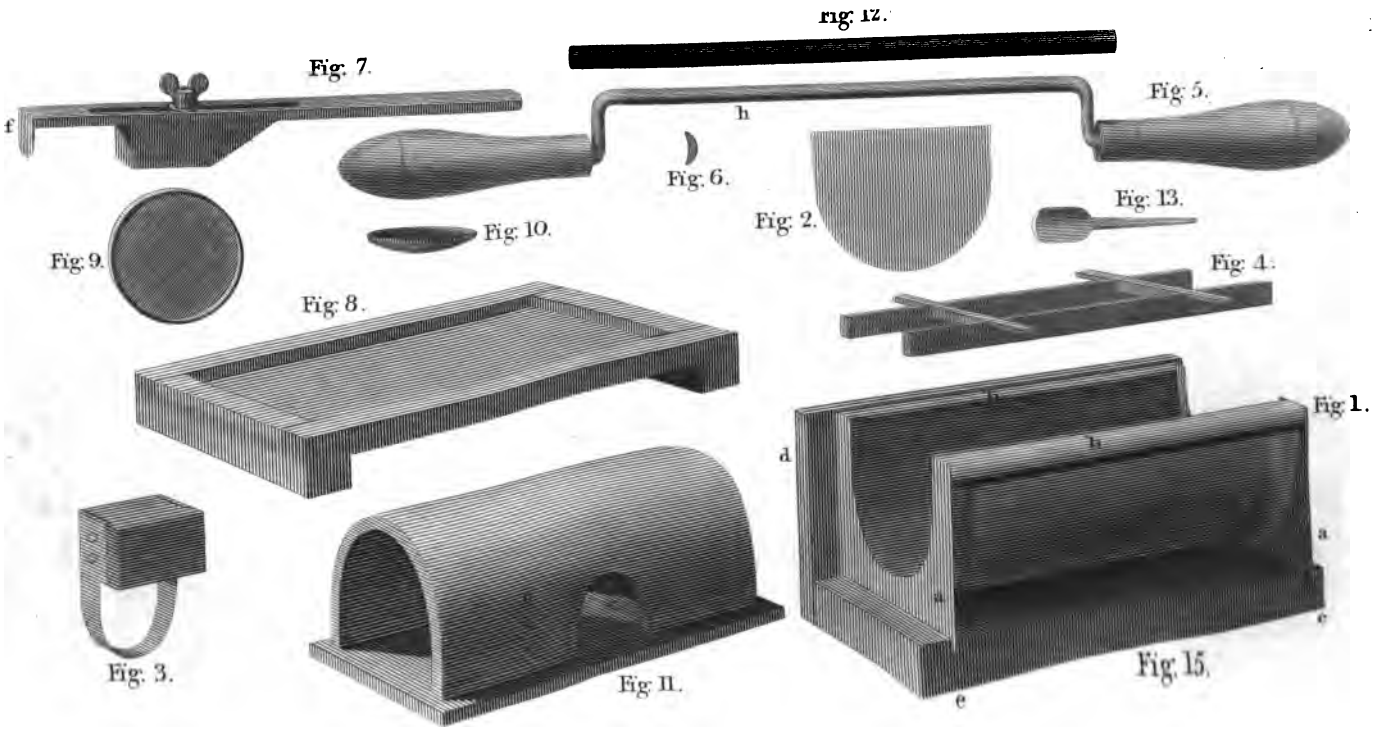
Fig: 12.
Fig: 7.
f
Fig: 5.
h
Fig: 6.
Fig: 10.
Fig: 2.
Fig: 13.
Fig: 9.
Fig: 4.
Fig: 8.
Fig: 1.
d
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Fig: 3.
Fig: 11.
Fig: 15.

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PAPER

IN

POLITE ARTS.

The THANKS *of the Society were this Session voted to Mrs.* HOOKER, *of Rottingdean, near Brighton, formerly Miss* EMMA JANE GREENLAND; *for Additional Remarks to her Method of making a Composition for Painting in Imitation of the Ancient Grecian Manner, as published in the 10th Volume of the Society's Transactions, for the Year 1792.*

A Specimen of this Mode of Painting is preserved in the Society's House.

SIR,

I HAD the pleasure to communicate to the Society for the Encouragement of Arts, Manufactures, and Commerce, in 1786, when Miss E. J. Greenland, my method of painting in imitation of the ancient Grecian manner or incaustic painting, and in consequence, they did me the honour to adjudge to me the Gold Pallet, and also afterwards to approve my account of the result of above fifty experiments per day, which

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which I made during more than four months in 1792, in the hope of discovering some means of making wax, gum-mastich and water unite like a cream, in order to expedite the formation of the composition for imitating the incaustic painting, which was published the same year by the Society of Arts. I now take the liberty of sending them another copy, but with some alterations and many additions, which I trust will be found calculated to facilitate and improve that method of painting, as they have arisen from much observation and reflection on several pictures I have painted since I had last the honour of addressing the Society. In consequence of the application of several gentlemen of the profession, I have drawn up this paper, which considering the former attentions of the Society, I thought it would be proper for me to offer first to them for their acceptance, but if they should not think it worthy of communication, I hope they will pardon the intrusion, and attribute it only to the sense of gratitude I feel for the honour already conferred on,

Sir,

Your most obedient Servant,

EMMA JANE HOOKER.

Rottingdean, Brighton, March 16, 1807.

To CHARLES TAYLOR, M. D. SEC.

Method of preparing and applying a Composition for painting in Imitation of the Ancient Grecian Manner.

Put into a glazed earthern vessel, four ounces and a half of gum arabic, and eight ounces, or half a pint (wine measure) of cold spring water; when the gum is dissolved,

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dissolved, stir in seven ounces of gum-mastich, which has been washed, dried, picked, and beaten fine. Set the earthern vessel containing the gum-water, and gum-mastich, over a slow fire, continually stirring and beating them hard with a spoon, in order to dissolve the gum-mastich: when sufficiently boiled, it will no longer appear transparent, but will become opaque, and stiff, like a paste. As soon as this is the case, and that the gum water and mastich are quite boiling, without taking them off the fire, add five ounces of white wax, broken into small pieces, stirring and beating the different ingredients together, till the wax is perfectly melted and has boiled. Then take the composition off the fire, as boiling it longer than necessary would only harden the wax, and prevent its mixing so well afterwards with water. When the composition is taken off the fire, and in the glazed earthern vessel, it should be beaten hard, and whilst hot (but not boiling) mix with it by degrees a pint (wine measure) or sixteen ounces more of cold spring water, then strain the composition, as some dirt will boil out of the gum-mastich, and put it into bottles: the composition if properly made, should be like a cream, and the colours when mixed with it, as smooth as with oil. The method of using it, is to mix with the composition upon an earthern pallet, such colours in powder as are used in painting with oil, and such a quantity of the composition to be mixed with the colours as to render them of the usual consistency of oil colours; then paint with fair water. The colours when mixed with the composition may be laid on either thick or thin, as may best suit your subject, on which account, this composition is very advantageous, where any particular transparency of colouring is required; but in most cases it answers best, if the colours be laid on thick, and they require the same use of the brush, as if painting

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painting with body colours, and the same brushes as used in oil painting. The colours if grown dry, when mixed with the composition, may be used by putting a little fair water over them; but it is less trouble to put some water when the colours are observed to be growing dry. In painting with this composition the colours blend without difficulty when wet, and even when dry the tints may easily be united by means of a brush and a very small quantity of fair water. When the painting is finished, put some white wax into a glazed earthern vessel over a slow fire, and when melted, but not boiling, with a hard brush cover the painting with the wax, and when cold take a moderately hot iron, such as is used for ironing linen, and so cold as not to hiss, if touched with any thing wet, and draw it lightly over the wax. The painting will appear as if under a cloud till the wax is perfectly cold, as also, whatever the picture is painted upon is quite cold; but if, when so, the painting should not appear sufficiently clear, it may be held before the fire, so far from it as to melt the wax but slowly; or the wax may be melted by holding a hot poker at such a distance as to melt it gently, especially such parts of the picture as should not appear sufficiently transparent or brilliant; for the oftener heat is applied to the picture, the greater will be the transparency and brilliancy of colouring; but the contrary effect would be produced if too sudden or too great a degree of heat was applied, or for too long a time, as it would draw the wax too much to the surface, and might likewise crack the paint. Should the coat of wax put over the painting when finished, appear in any part uneven; it may be remedied by drawing a moderately hot iron over it again as before-mentioned, or even by scraping the wax with a knife: and should the wax by too great or too long an application of heat form into bubbles at particular places, by applying

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applying a poker heated, or even a tobacco-pipe made hot, the bubbles would subside; or such defects may be removed by drawing any thing hard over the wax, which would close any small cavities.

When the picture is cold, rub it with a fine linen cloth. Paintings may be executed in this manner upon wood (having first pieces of wood let in behind, across the grain of the wood to prevent its warping,) canvass, card, or plaster of Paris. The plaster of Paris would require no other preparation than mixing some fine plaster of Paris in powder with cold water the thickness of a cream; then put it on a looking-glass, having first made a frame of bees-wax on the looking-glass the form and thickness you would wish the plaster of Paris to be of, and when dry take it off, and there will be a very smooth surface to paint upon. Wood and canvass are best covered with some grey tint mixed with the same composition of gum-arabic, gum-mastich, and wax, and of the same sort of colours as before-mentioned, before the design is begun in order to cover the grain of the wood or the threads of the canvass. Paintings may also be done in the same manner with only gum-water and gum-mastich, prepared the same way as the mastich and wax; but instead of putting seven ounces of mastich, and when boiling, adding five ounces of wax, mix twelve ounces of gum-mastich with the gum-water, prepared as mentioned in the first part of this receipt: before it is put on the fire, and when sufficiently boiled and beaten, and is a little cold, stir in by degrees twelve ounces, or three quarters of a pint, (wine measure) of cold spring water, and afterwards strain it. It would be equally practicable painting with wax alone, dissolved in gum-water in the following manner. Take twelve ounces or three quarters of a pint wine measure of cold spring water, and four ounces and a half of gum-arabic, put them into

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a glazed earthern vessel, and when the gum is dissolved, add eight ounces of white wax. Put the earthern vessel with the gum-water and wax upon a slow fire, and stir them till the wax is dissolved and has boiled a few minutes: then take them off the fire and throw them into a bason, as by remaining in the hot earthern vessel the wax would become rather hard; beat the gum-water and wax till quite cold. As there is but a small proportion of water in comparison to the quantity of gum and wax, it would be necessary in mixing this composition with the colours, to put also some fair water. Should the composition be so made as to occasion the ingredients to separate in the bottle, it will become equally serviceable if shaken before used to mix with the colours.

I had lately an opportunity of discovering that the composition which had remained in a bottle since the year 1792, in which time it had grown dry and become as solid a substance as wax, returned to a cream-like consistence, and became again in as proper a state to mix with colours, as when it was first made, by putting a little cold water upon it, and suffering it to remain on a short time. I also lately found some of the mixture composed of only gum-arabic water and gum-mastich, of which I sent a specimen to the Society of Arts in 1792; it was become dry, and had much the appearance and consistency of horn. I found, on letting some cold water remain over it, that it became as fit for painting with, as when the composition was first prepared.

EMMA JANE HOOKER.

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PAP

IN

MANUFA

FIFTEEN GUINEAS *were this*
ANDER DUFF, *of Church-S*
improved Machine for weavi
The following Communication
working Model may be seen
with Patterns of the Figur
Machine.

GENTLEMEN,

I HAVE sent a model of a mac
which I am the inventor, it i
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not only extremely difficult to b
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PAPERS

IN

MECHANICS.

The GOLD MEDAL *of the Society was this Session voted to Mr.* CHRISTOPHER WILSON, *Richard-Street, Commercial Road, London, for a secure Sailing Boat, or Life Boat.*

The following Communications were received from him, and explanatory Engravings are annexed.

A Model and Drawings are preserved in the Society's Repository.

SIR,

HEREWITH you will receive Drawings of a neutral-built self-balanced Boat, with an explanation, which I request you will have the goodness to lay before the Society for the Encouragement of Arts, &c. for their inspection and approbation. I have made the explanation as clear as I can. Its construction will obviate the danger of its being overset by persons crowding on one side, in getting in or out

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of the boat; it will facilitate the landing of men on shore or in boarding ships, and will carry a much greater press of sail without danger.

As to the building part, I think that may be easily understood. My boat was made by men that had never before seen a boat built, and I flatter myself the Society will approve of it.

I am, Sir,

Your most obedent humble Servant,

CHRISTOPHER WILSON.

March 10, 1806.

To C. TAYLOR, M. D. SEC.

An Explanation of the Engravings of a neutral-built self-balanced Boat.

By the term neutral is meant, what is neither of the two present modes now in use, i. e. clincher and carver, but both united, viz. clincher in the inside and carver on the outside, which neutralizes both the two into a third; and as every thing has a distinguishing name, I have taken the liberty to present it to the public, under the name of a Neutral Boat.

The two modes of clincher and carver-built have each their separate advantages and disadvantages in regard to each other.

I shall begin with the clincher first. As the sides of the planks are firmly fastened to each other, by lapping over and rivetting, they are much stronger than if the edges only butted, and they have the property of being made tight without caulking, only in the haddings and keel seams,

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boat. The longitudinal slips are represented lighter-coloured, and placed over the joints where the edges of the planks meet; they must be rivetted on to each adjoining plank, near the edge, in the same manner as clincher-built vessels, with a sufficient quantity of blair, made of tar and flocks, such as is in common use in the North of England, (or any other caulking), between the slips and planks, which will always keep them tight, as long as the boat remains unstaved, or the planks worn through. These slips, each being rivetted to the two adjoining edges of the planks, as shown in Fig. 4, will make the joint as strong as the joint of a common clincher-built boat, and as tight, without the risk of any external damage. Those joints have also this advantage, that the planks will not have their sides bevelled off, but be of an equal thickness from edge to edge, which is not the case in clincher-built vessels, for at the ends they are half bevelled away, so as not to bear clinching. By the neutral system two inches in the breadth of each plank will be saved in the laps, which may be considerable in the conversion of plank. I set little value on the slips, as there is always a sufficiency of waste in cutting the planks to a proper form.

A boat of this construction has all the strength of one clincher-built, and can be made as light or lighter. It is free from the disadvantages of irregular outsides, and from the difficulty of repairing, which in this can be performed by any common workman in wood, as I have found by experience. A boat built this way has a fair and smooth outside, it has all the advantages of a carver-built one, at the same time it is clear of the disadvantages of being loaded with unnecessary wood, which makes the carver-work very heavy, the liability of leaks, and frequent want of caulking. There is one evil which both carver and clincher-built boats have

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Mr. C. Wilson's secure Sailing Boat or Life Boat.

Fig: 1.

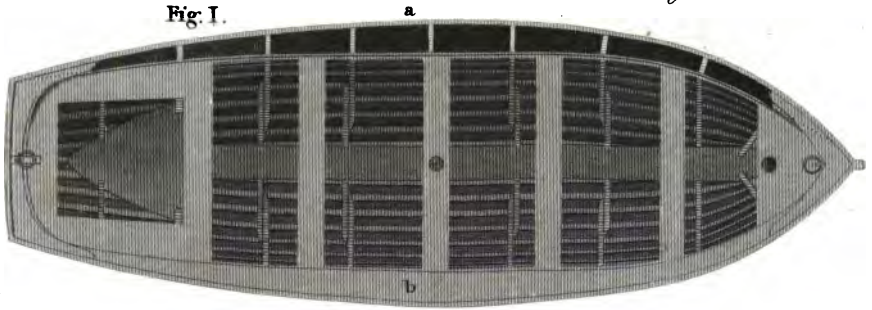


Fig: 2.

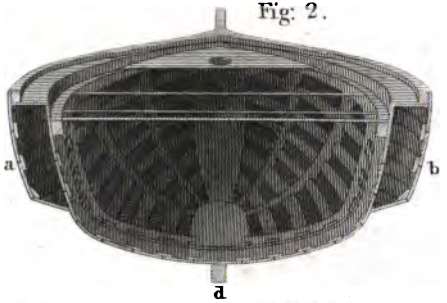


Fig: 3.

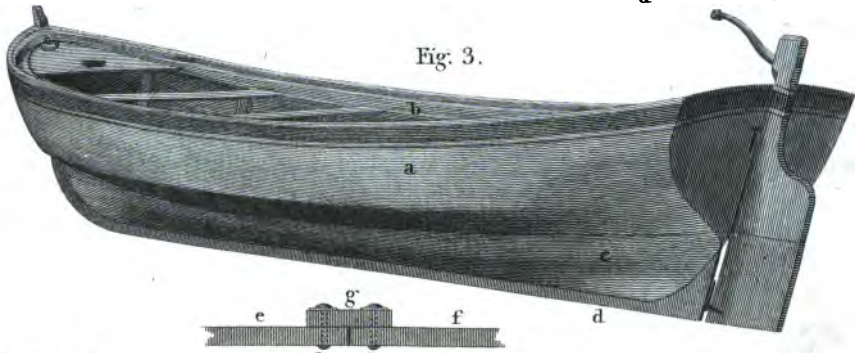
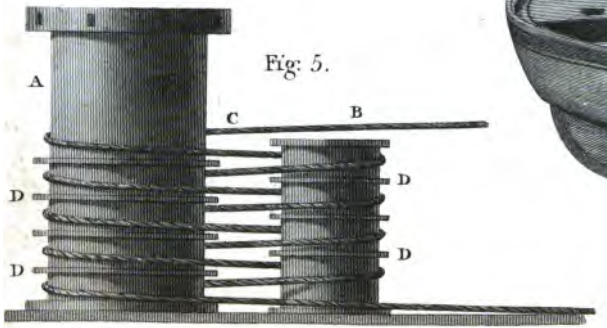


Fig: 4.

Fig: 5.



Mr. I. W. Boswell's improved Capstan.

S. Porter sculp.

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have in common, that of having keel seams, and a vacancy between the sand or garboard streak, and the upper part of the keel, which soon gets filled with dirt, and remains so, which naturally retains moisture, and speedily rots the wood. In this mode that evil is removed, by having the midship plank bolted on to the keel, wide enough to come over each side of the keel to clinch the slips on, this not only removes the evil, but saves a great deal of trouble in making the rabbets in the keel, and various bevellings in the sand streaks, which must be done by a good workman.

These boats require no larger timbers than common clincher-built boats, as the timbers need no greater notches, but with this difference, that these timbers will catch the slips that are rivetted over the joints of the planks each way, and so the timbers and slips will brace one another, and add an additional strength; but in the clincher-built boats, the timbers catch the laps of the seams only one way, and consequently form no brace whatever.

All I need to explain further on the neutral system is its application. It can be applied to all open boats, of whatever form or use, to all coal and other barges, lighters, or any vessels used in rivers or canals, and also to all large cutters and luggers, which are now clincher-built.

Explanation of Plate 4, *Fig.* 1, 2, 3, 4.

Fig. 1, is a bird's-eye view of the boat, shewing the projecting balance bodies, or hollow sides *a b*, one of which *a*, is left open to show the partitions which are placed opposite to each timber, and are water-tight; by this means if one or more should be broken, the rest would keep the vessel buoyant. These partitions gradually lessen towards each

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each end, where the planks unite, so as to make a similar appearance to any other boat when in the water.

Fig. 2, shews the depth and form of the cells or hollows, as they appear in a section of the boat; also the manner in which the slips are placed over the joinings, or seams of the planks.

Fig. 3, is a perspective view of the boat, in which *a b* show the projecting balance bodies, or hollow sides, which would render the boat buoyant if her bottom was staved in. *c*, the lower part or body of the boat, from which the projections commence; *d*, the keel.

Fig. 4, shows the manner in which the planks or timbers of the boat are united; *e f*, are two planks of the boat; *g*, the slip of wood placed over them, and secured to them by the rivets *h h*.

The section (Fig. 2), will best explain the nature and utility of the self-balanced boat. The balance bodies form two separate holds, to put any thing in, such as provision, arms, &c. which are wanted to be kept dry, having locker lids, to open at the top of the different partitions in the holds, as fancy or utility may require; or part of them may be filled with cork shavings, and by that means, if the boat should happen to fill by any accident, she cannot sink.

In the boat I have altered for Government, the balance bodies, (if the interior of the boat was filled with water), would exclude as much water, between the inside of the boat and the outside, as is equal to a body of water of 1ton. 17cwt. 2qrs. which is a great deal more than the weight of men that will go in her, consequently they can run no risk whatever of being drowned, and even if she had a hole through her bottom, she would always keep a sufficient height out of the water either for rowing or sailing.

But the main object is to make her sail and row much faster

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faster than other boats, and both on calculation and trial my boat will be found to sail much faster, and with much less danger than other boats.

I now come to the advantage of rowing.—As the balance sides project a foot beyond the resisting part in the water, there is that leverage on the boat (over a common one), and also the same in the length of the loom of the oar, that is in the inside from the gunwale of the boat, which allows the whole of the oar to be lengthened, and by that means it describes a larger circle in the water, and makes a longer pull: the oars for the Government boat I have made, are lengthened from 14 to 18 feet.

The experiment of having two spars fixed at a distance from a boat's gunwale, and the oars to work from them, has often been tried and found to answer, but this has a great advantage over that method.

There is another advantage or property which this boat has, she cannot roll at sea, but always keeps a level position as far as the surface of the sea will allow; she may heel but not roll, as the balances are always ready to catch either way, and the opposite one assists the other by its weight out of water and gravitation; neither can this boat pitch like another, for the balance bodies being out of the water, and the breadth of six feet only in the water, it can only act with a gravity on the water, equal to a boat of the weight of six feet, but as the resistance of the water upwards equal to a boat of eight feet wide.

Or I may make this mechanical simile: Suppose a workman uses a chissel to smooth a surface of wood, by laying too great a stress on the tool it will go too far into the wood for him to force it along in the direction wanted, but put that chissel into a stock like a plane-stock, and set it to the depth required, then the stock will prevent its going too

far

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far in, and he can work easily though the plane be pressed on ever so hard. A view of the Engraving will elucidate that comparison, as the balance bodies lie parallel with the surface of the water lengthways. The national importance of such boats, I leave to the public to decide. I must here observe, that my plan contains two distinct and separate improvements, viz. my neutral mode of building, and the application of the balance bodies.

The first improvement relates to the *building* of boats, barges, &c. in general. The second is only partial, and applicable to boats of peculiar descriptions or uses; that is, all such as are wanted for dispatch, safety, or pleasure, or occasionally for life-boats: as there can be no question of the self-balanced boats built upon my plan, rowing and sailing faster than other boats, and they may be used to go to sea when others cannot; but the application of the balance bodies is not meant as a general one, as it is not fit for vessels of burthen that are sometimes light, and at others heavy laden, when the difference of the draught of water is considerable.

CHRISTOPHER WILSON.

CERTIFICATE.—We whose names are hereunto subscribed have examined the boat building on Mr. Wilson's plan, (which he calls the neutral plan) and are of opinion that it will be attended with many advantages.

The boats can be built as light as those that are clincher-built, preserving a smooth surface, and will not require caulking; and they can be easily repaired by any carpenter.

The advantage this boat possesses by having air gunwales are obvious, and from the partial trial we have had of

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of the boat's sailing which he has altered, we are of opinion that his improvement in the keel and formation of the boat's bottom, will give her greater stability than other boats of the same dimensions, with the properties of sailing well and drawing very little water.

MALCOLM COWAN, R. N.
JAMES NICOLSON, R. N.

London, May 7, 1806.

GENTLEMEN,

PERMIT me to present my thanks and acknowledgment, for the truly polite and distinguished manner in which (though a stranger,) you have permitted me to visit your Committee; the Society of which the same is formed I hold in the highest estimation, and have deeply to regret the distance that prevents my offering myself a candidate for a seat amongst you.

The last time I had the honour of attending your Committee, Mr. Wilson's new Life-Boat became the subject of discussion, the operation of which you did me the honour of requesting me to acquaint you of as soon as an opportunity presented itself for a fair trial of her at sea.

About three o'clock in the afternoon of Friday last, the tide being about quarter flood, and the wind at South-west, blowing excessively hard, an object was discovered in the Offing at about two leagues distance, bearing from the piers of Newhaven, W. S. W. which had the appearance of a vessel

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vessel water-logged, and with only her foremast standing. This induced Mr. Thomas Tasker (the person whom I appointed master of the boat, and which I have named the *Adeline*,) with seven others, to put to sea, with a view of rendering assistance to the supposed distressed vessel, and although the breakers were tremendous, and the sea without them running very high, the boat under the management of the crew before-mentioned, ranged as coxswain, six setters, and a bowman, went out of the harbour in a very lively stile, and soon came up with the object in pursuit, which proved to be a beacon, or light-house, of a singular construction triangularly built, and clench-board covered in its floating case, with a mast rigged out in the centre of one of the sides, and supposed to have broken a drift from the enemy's coast by the boisterous weather: finding its magnitude too vast for their strength to tow, and the evening approaching, they returned. Numbers of persons were assembled on the piers to witness the action, power, and performance of the boat, who were highly pleased and gratified. I was not present myself, but the next morning one of the crew was sent to me from Newhaven to this place, who stated that the whole of them were so fully satisfied with the safety and superior powers of the boat, that they shall not be afraid to put to sea in any weather when the distresses of their fellow-creatures claim their exertions and assistance. They particularly observed, she, with the six oars manned, pulled extremely light and easy through the water, and that though the breakers they pulled through, and the heavy seas they rode over were awful, she did not ship ten gallons of water the whole trip, neither were the men wet on the seats. We have now at Newhaven one of Mr. Greathead's boats, provided by subscription, but from the difficulty of getting her to sea, and her weight and construction rendering

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rendering it almost impossible to pull her through the broken water, it is very improbable she will ever be used.

My opinion is, that Mr. Wilson's boat will answer. Its cost I conceive will exceed 150*l.* including the building and fitting her out.

I have the honour to subscribe myself with the greatest respect,

Gentlemen,

Your obliged and most obedient humble Servant,

WILLIAM BALCOMBE LANGRIDGE.

P. S. I should have observed, that the crew pulled her *stern on* at every sea, and that such water as in general fills over the bow of ordinary boats, is received by the fore-part of her flammings, or floor of extended sides, and sent or dispersed side-ways.

Lewes, Sussex, Dec. 25, 1806.

To C. Taylor, M. D. Sec.

The Gold Medal *of the Society was this Session voted to* J. Whitley Boswell, *Esq. of No.* 15, *Clifford's Inn, for his Model of a Capstan, which works without requiring the Messenger or Cable coiled round it to be ever surged.*

The following Communications were received from him, and an explanatory Engraving is annexed

A Model of the Machine is placed in the Society's Repository.

SIR,

I request you will lay before the Society of Arts, &c. the model of a capstan contrived by me, which works without requiring the messenger or cable coiled round it to be

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ever surged, an operation necessary with common capstans, which is always attended with delay, and frequently with danger. Capstans of this kind can be made by a common shipwright, and would not be liable to be put out of order. They also would not occasion any additional friction or wear to the messenger or cable, in which particulars they would be superior to the other contrivance hitherto brought forward for the same purpose; they also would much facilitate the holding on.

The great loss of time and great trouble which always attends applications to the Navy Board, prevent my attempting to bring the matter before the public through that channel, though I have had the most unequivocal approbation of the capstan from the two gentlemen of that board best qualified to judge of it. I mention this, least it might be thought that my not applying there first was from any doubt of the goodness of the invention. If the Society should approve of the capstan, I will draw up a more minute account of it for publication.

I am Sir,
Your very humble Servant,

Hatton Garden, Oct. 29, 1806.

To C. TAYLOR, M. D. SEC. J. W. BOSWELL.

SIR,

I HAVE examined your model of a Capstan, which is calculated to prevent the surging of the messenger when heaving in the cable, it certainly possesses great merit, and the idea to me is quite new.

I am, Sir,
Your humble Servant,
WILLIAM RULE.

Somerset-place, November 12, 1806.

To MR. BOSWELL.

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Hatton Garden, Novembe

To C. TAYLOR, M

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SIR,

In obedience to your intimation, that a written explanation of the advantages to be obtained by the use of capstans made according to the model, which I laid before the Society for the Encouragement of Arts, &c. would be acceptable, I send the following, which I hope will make the subject sufficiently clear.

As few but mariners understand the manner in which cables are hawled aboard in large ships, it will probably render the object of my capstan more manifest, to give some account of this operation.—Cables above a certain diameter, are too inflexible to admit of being coiled round a capstan; in ships where cables of such large dimensions are necessary, a smaller cable is employed for this purpose, which is called the *messenger*, the two ends of which are made fast together so as to form an endless rope, which, as the capstan is turned about, revolves round it in unceasing succession, passing on its course to the head of the ship, and again returning to the capstan. To this returning part of the messenger, the great cable is made fast by a number of small ropes, called nippers, placed at regular intervals; these nippers are applied, as the cable enters the hawse hole, and are again removed as it approaches the capstan, after which it is lowered into the cable tier.

The messenger, or any other rope coiled round the capstan, must descend a space at every revolution, equal to the diameter of the rope or cable used; this circumstance brings the coils in a few turns to the bottom of the capstan, when it can no longer be turned round, till the coils are loosened and raised up to its other extremity, after which the motion proceeds as before. This operation of shifting the place of the

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the coils of the messenger on the capstan, is called *surging the messenger:* It always causes considerable delay; and when the messenger chances to slip in changing its position, which sometimes happens, no small danger is incurred by those who are employed about the capstan.

The first method that I know of, used to prevent the necessity of surging, was by placing an horizontal roller beneath the messenger, where it first entered on the capstan so supported by a frame, in which it turned on gudgeons, that the messenger in passing over it was compelled to force upwards all the coils above the capstan, as it formed a new coil.

This violent forcing of the coils upwards along the barrel of the capstan, not only adds considerably to the labour in turning the capstan, but from the great friction which the messenger must suffer in the operation, while pressed so hard against the capstan, (as it must be by the weight of the anchor and strain of the men,) could not but cause a very great wear and injury to the messenger, or other cable wound round the capstan; and that this wear must occasion an expense of no small amount, must be manifest on considering the large sums which the smallest cables used for this purpose cost.

The next method applied to prevent surging, was that for which Mr. Plucknet obtained a patent, the specification of which may be seen in the Repertory of Arts, No. 46. In this way a number of upright puppets or lifters, placed round the capstan, were made to rise in succession, as the capstan turned round by a circular inclined plane placed beneath them, over which their lower extremities moved on friction wheels, and these puppets, as they rose, forced upwards the coils of the messenger on the barrel of the capstan. This was a superior method to the first, as the operation of

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forcing upwards the coils, was performed more gradually by it; but still the wear of the messenger from the lateral friction in rising against the whelps of the capstan remain undiminished.

The third method used for the same purpose, was that proposed by captain Hamilton. It consisted in giving the capstan a conical shape, with an angle so obtuse, that the strain of the messenger forced the coils to ascend along the sloped sides of the barrel. The roller first mentioned was sometimes used with this capstan, of which a full account is inserted in the Repertory of Arts, vol. 2. The lateral friction, and wear of the messenger against the whelps of the capstan, is equally great in this method as in the others; and it, besides, has the inconvenience of causing the coils to become loose as they ascend; for as the upper part of the barrel is near a third less in diameter than the lower part, the round of the messenger that tightly embraced the lower part, must exceed the circumference of the upper extremity in the same proportion.

In the method of preventing the necessity of surging, which the model I have had the honour of laying before the Society represents, none of the lateral friction of the messenger or cable against the whelps of the capstan, (which all the other methods of effecting the same purpose before-mentioned labour under,) can possibly take place, and of course the wear of the messenger occasioned thereby will be entirely avoided in it, while it performs its purpose more smoothly, equally, and with a less moving power than any of them.

My method of preventing the necessity of surging, consists in the simple addition of a second smaller barrel or capstan of less dimensions to the large one; beside which it is to be placed in a similar manner, and which need not

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easily pass over it in heaving round, when it is thought fit to use capstan bars on the same deck with the small barrel. As two turns of the messenger round both barrels will be at least equivalent to three turns round the common capstan, it will hardly ever be necessary to use more than four turns round the two barrels.

The circumstance which prevents the lateral friction of the messenger in my double capstan, is, that in it each coil is kept distinct from the rest, and must pass on to the second barrel, before it can gain the next elevation on the first, by which no one coil can have any influence in raising or depressing another; and what each separate coil descends in a single revolution, it regains as much as is necessary in its passage between the barrels, where in the air, and free from all contact with any part of the apparatus, it attains an higher elevation without a possibility of friction or wear.

I have described my double capstan, as it is to be used in large vessels, where messengers are necessary, from the great size of the cables; but it is obvious that it is equally applicable in smaller vessels, as their cables can be managed with it in the same manner as is directed for the messenger. The same principle may also be easily applied to windlasses, by having a small horizontal barrel placed parallel to the body of the windlass, and having both fitted with rings, in the same way as the capstan already described. The proper place for the small horizontal barrel is forward, just before the windlass, and as much below its level as circumstances will admit; it should be furnished with catch-palls as well as the windlass.

Besides the advantages already stated, my proposed improvement to the capstan has others of considerable utility. Its construction is so very simple, that it is no more liable to derangement or injury than the capstan itself. Its cost can be

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be but small, and every part of it can be made by a common ship carpenter, and be repaired by him at sea if damaged by shot. It will take up but little room, only that of an half-barrel cask; and it is of a nature so analogous to that kind of machinery to which sailors are accustomed, that it can be readily understood and managed by them.

In order to render the description of my double capstan more clear, I annex a sketch of it, as fitted up in the manner proposed.

I am, Sir,

Your very respectful humble Servant,

J. WITLEY BOSWELL.

To C. TAYLOR, M. D. SEC.

Reference to the Engraving of Mr. Boswell's improved Capstan, to prevent the necessity of surging. Plate 4, Fig. 5.

A Represents the larger of common capstan used on board ships.

B Another capstan of less dimensions, placed in a similar manner.

C The coils of the messenger passing alternately round the large and small capstans, but with their direction reversed on the different barrels, so that they may cross each other in the interval between them.

D D D D Projecting rings round each capstan or barrel, so fixed on the two barrels, that those on one barrel should be exactly opposite the middle of the intervals between those on the other barrel.

TWENTY

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neous in principle. Some are cylindrical; others formed of frustums of cones united at their bases, without any determinate proportion in their perimeters, or regard to the weight of the rope or chain working thereon, both of which are absolutely necessary to acquire a maximum effect.

The convex surface of a frustum of a cone, is = to the convex surface of a cylinder of the same altitude, having its circumference = to half the sum of the perimeters of the frustum: and circumferences of circles being to one another as their diameters, the surface of a barrel formed of two frustums of right cones (united at their bases), each 64 inches diameter at one end, 32 at the other, and 54 long, which is the size we have adopted here, is = to the surface of a plain cylindrical one, 48 inches diameter, and 108 long. Each will therefore bend the same length of cordage in an equal number of revolutions, and so far they are equal to each other; but they vary very considerably in the momenta required to work them.

Let a = the weight of the basket of coal, and b = that of the descending part of the chain; then, on the cylindrical barrel, when the former is hooked to the end of the latter, and eased from the bottom of the pit (the opposite chain being bent on the barrel), $a + b$ = the counterpoise required at 24 inches radius; and when it is wound up to the top (the descending part of the opposite chain hanging down the pit), $a - b$ = the counterpoise required at the same radius.

On the barrel formed of frustums of right cones, when the load is eased from the bottom of the pit, it and the chain are suspended from one of the smaller perimeters (the opposite chain being bent on the barrel), $\frac{a}{2} + \frac{b}{2}$ = the counterpoise required at 32 inches radius; and when it is wound

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wound to the top of the pit, it is suspended from the larger perimeter of one frustum, whilst the descending part of the opposite chain is hanging down the pit from the smaller perimeter of the other, and in that position $a - \frac{b}{2}$ = the counterpoise required at the same radius.

Consequently, by supposing a, the weight of the basket of coal, to be 800lbs. and b, the weight of the descending part of the chain, 400lbs. (these are the weights which we have adopted here), we have the counterpoise required upon the cylindrical barrel, at 24 inches radius, 1200 lbs. when the basket of coals is at the bottom of the pit, and 400 lbs. when it is at the top; but upon the barrel formed of frustums of right cones, the counterpoise required at 32 inches radius is 600lbs. in each position. And as the counterpoise required is in inverse proportion to the length of the radius at which it is applied, we have 24 : 32 :: 600 : 800 lbs. the counterpoise required upon the barrel formed of frustums of right cones, at 24 inches radius. Again, as the descending part of a chain + a basket of coal of double its weight, unbending out of equi-distant grooves from the base of a frustum of a right cone, towards its smaller perimeter, balances in every revolution of the barrel, a chain of equal weight + a basket of coal, of double its weight, bending into equi-distant grooves from the smaller perimeter of a similar frustum towards its base, the counterpoise required must be equal in all parts of the descent.

So that by making the weight of the basket of coal to that of the chain, and the perimeters of the frustums of cones, which form the barrel, to each other, in the proportion of two to one, *a maximum is obtained, by which a barrel of this description requires one-third less momentum, (and consequently one third less expence), to work it than a cylindrical one.*

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The barrels are made by nailing two to three inch planks upon wooden or iron curves, as in the common way, and afterwards folded, spirally, with wrought iron tire, so as to leave a vacancy of about half an inch between each fold, for the lower part of the ellipses of those links of the chain, which work vertically to move in, and keep the coils at an equal distance from each other.

The wrought-iron tire is of two kinds, the one for conical, and the other for cylindrical barrels; the cross section of that for the barrel formed of frustum of cones, is nearly a parallelogram, ($1\frac{1}{4}$ inch by $\frac{5}{8}$ths, out of which the ellipsis is taken, $1\frac{1}{4}$ inch by $\frac{1}{2}$ an inch;) out of the upper part of which about one-fourth of an ellipsis is taken, to form a horizontal bearing for those links of the chain which lie flat upon the tire; the cross section of the latter is a rectangle. Both are rolled into their proper form, and holes of a quarter of an inch diameter punched therein, at a foot from each other, for the purpose of nailing them to the planking of the barrels.

As the method of working chains in grooves has only been in use about three years and a half, it is impossible to give a certain idea in respect to their durability. In all that time not a single link has broke, or the least accident occurred therefrom, though Messrs. T. W. and B. Botfield, have nearly three thousand feet in daily motion at this manufactory. The wear has also been so trifling, that I conceive they will sooner fail from oxydation than attrition: for although the machines for raising coal and ore from the mines are in use twelve hours in the day, the brown oxide of iron formed upon the links by exposure to the atmosphere, is seldom disturbed by the motion of the chain. It is probable, therefore, that in this manner of working, chains will last at least fifteen years, but to be certain we take it at twelve in the

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the subjoined comparative statements, which shew that the expence of chains as cordage is only about a twenty-fourth part of that of hempen ropes.

The method of folding wooden barrels with wrought iron tire, does away the necessity of cast iron ones, and may be applied to every wooden barrel now in use at a small expence, as may be seen by the estimate which is subjoined.

There are now at work in the mines of this manufactory, four machines, with wooden barrels folded with wrought iron tire, one cylindrical, and three formed of frustums of cones, raising upwards of eight hundred tons of coal and iron ore per week from pits of about eighty yards deep; and three others are in hand.

I look forward with confidence to the general substitution of chains for hempen ropes at all our mines and manufactories, a matter of importance to the British empire, as it will considerably lessen the consumption of hemp, and render it more abundant for the exigencies of the Navy.

Wishing to give this method of working chains all the publicity in my power, I will obviate all apparent (for there are no real) difficulties which may occur to any person in their application, on his stating them in a letter *post paid* addressed to me here.

I am, Sir,

Your most obedient Servant,

GILBERT GILPIN.

Old Park Iron Works, near Shifnal, 2 Feb. 1807.

To C. Taylor, M. D. Sec.

Expence

Expence of tarred ropes for a machine for raising coal and ore from a pit eighty yards deep, for three years and four months.

	£.	s.	d.
Ten ropes each 110 yards long, 6 inches in circumference, and 5 lbs. per yard, 5500 lbs. at 8*d.* per lb.	183	6	8
Deduct 10 worn out ropes 2750 lbs. at 1*d.* lb.	11	9	2
Net expence of ropes for 3 years and 4 months	£. 171	17	6

Expence of chains for a machine for raising coal and ore from a pit eighty yards deep.

Two chains each 110 yards long, formed of $\frac{5}{8}$ inch iron, 28 links to the yard, and weighing 5 lbs. per yard, 11001bs. at 6*d* per lb.	27	10	0
180 yards of wrought iron tire, with the holes punched therein weighing 7lbs. per yard, at 1*s.* 6*d.* per yard	13	10	0
540 Nails for the tire, 27 lbs at 6*d.* per lb.	0	13	6
Workmanship, nailing the tire on the barrel, 180 yards at $2\frac{1}{2}$*d.* per yard	1	17	6
	£. 43	11	0

The above chains and tire have been at work three years and four months, and do not appear to be one-fourth worn.

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other. We are induced to adopt the latter plan to do away by *degrees* the prejudices which Miners and Colliers have imbibed against chains, from accidents which they have been witnesses to in the common way of working. Though the causes of similar accidents are entirely done away by the new method of working, some little of the old prejudice remains; a thing not to be wondered at when we consider the uninformed state of this description of men, arising from a life spent in the dark recesses of mines; and, as it were, cut off from the rest of society.

From the uniformity and safety of the new method, their prejudices against chains are, however, rapidly wearing away, and I have no doubt that in a few years they will even be preferred. It is certainly more reasonable to suppose that this will be the case from the superiority which iron holds in point of strength of materials, than that ropes even should have been known, (at least in the mines,) had the new method of working chains been in use prior to the introduction of hemp.

By excusing the liberty which I am now taking, you will oblige,

Sir,

Your obedient Servant,

GILBERT GILPIN.

Old Park Iron Works, March 7, 1807.

To C. TAYLOR, M. D. SEC.

Reference to the Engraving of Mr. Gilbert Gilpin's improved Machine for raising Coal, Ore, &c. *Pl.* 5. fig. 1, 2, 3, 4.

Fig. 1. *a.* A crank to which the connecting rod is fixed to attach the machine to the steam-engine which works it.

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and ore are loaded into waggons, and afterwards drawn upon iron rail-ways to the furnaces, forges, &c.

Fig. 3. A section of a part of the barrel and tire, showing the manner the links of the chain lay on it, on a scale of 3 inches to the foot.

Fig. 4. A section of the pulley, with a link of the chain lying in it.

In a large machine the barrel is fixed 24 or 25 yards from the pit, which is a distance of nine feet in the model sent to the Society.

Although the small chain for the model was made in Birmingham, it is remarkably full of twist, and the links in general awry where they join, in some parts as much as half the thickness of the link. It does not, therefore, keep well in the grooves, or, indeed, will it at all without a weight of 5 or 6lbs. attached to the end of it, and the barrel and frame at the proportional distance of about nine feet from each other.

The SILVER MEDAL *of the Society was this Session voted to Mr.* A. STASS, *No.* 18, *Porter-street, Newport Market, for a Machine for closing Boots and Shoes in a standing Posture.*

The following Communication was received from him; an Explanatory Engraving is annexed; and a complete Machine is placed in the Society's Repository.

SIR,

I BEG leave to acquaint you, that I have invented a machine in which a numerous class of working-men are greatly interested, as it preserves their health, and forwards their work

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April, 8, 1807.

To C. TAYLOR,

Reference to Mr.
Pl. VI.

Fig. 1. *a.* The
joint acting within
section of the block
c. A strong piece
three holes or mort
and thereby to alte
holder; the sloping

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being one over the other are to raise or lower the work to suit the height of the workman; *d d* the lower arms of the boot-holder; *e e* straps from the pedal *m*, joined to the arms by small hooks, by which means the foot being pressed on the pedal, tightens the work in the boot-holder; *f f* a box or table with a drawer under it.

g. A crossing strap, serving for the pedal strap, to be fastened to when the boot-holder is placed obliquely.

Fig. 2. A side view of the boot-holder and block.

Fig. 3. A section of the joint in the block, one arm of the clamp or boot-closer being mortised through the other.

Fig. 4. A side view of the table with a half round arm *h* (mortised into the post *i*), having a strap *k* reaching down to the pedal to hold the work on; *l* another mortise for the post *i* to turn the work the other end foremost.

Fig. 6. A section of the block *h*.

Fig. 7. A plan of the table, showing the two mortises of the post *i*.

The following Persons have given their Testimony to the Utility of the Machine, viz.

JOHN CLARKE JERVOISE, Esq. Hanover-square.
JOHN HAY, Chandos-street, Boot-maker.
EMANUEL VAUGHAN, 4, Clement's-inn, Boot-maker.
JOSEPH PROUD, 46, Bedford-street, Boot-maker.
JOHN WALKER, 21, Vere-street, Oxford-street.
J. LAURIE, Harness-maker, Oxford-street.
FRANCIS POWELL, Chandos-street, Boot-Maker.

TWENTY

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TWENTY GUINEAS *were this Session voted to Mr.* CHARLES LE CAAN, *of Llanelly in Wales, for improved Tram-Plates for Carriages on Rail Roads.*

The following Communication was received from him, and an Engraving is annexed.

Specimens of the Tram-Plates and Drawings are placed in the Society's Repository.

SIR,

I HAVE forwarded to the Society of Arts, &c. a specimen of my new method of laying rails, or tram-plates, on such a plan as has met the entire approbation of those who have seen it, and are acquainted with the principle on which such roads should be formed. Rail roads are daily increasing, from the great advantage they afford to those manufactories connected with mines and minerals, particularly to collieries. They also promote agriculture, by occasioning lime to be procured from places almost inaccessible by any other means, or from whence it could be otherwise brought on moderate terms.

I flatter myself that every improvement on this system will be of national importance. The honour I received last year from the Society of Arts, &c. has stimulated me to submit the present subject to their consideration.

I have also sent a drawing of my method of laying the tram-plates, with an estimate of the saving that will arise to the public, by adopting the said method, with necessary remarks on the principle on which it is founded. The leading rail or tram-plate has neither tenon or mortise over the plug. The stop-plate terminates the specimen, which stop-plate should go in with some degree of tightness when laid for actual use, but in the present case that force is not ne-

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cessary, as the wooden blocks by a carriage of upwards of 200 miles, may in some small degree be misplaced. I hope any impediment of that nature will be rectified or allowed for. I wish it to be understood, that a stop-rail is intended to be placed at every 30 yards, at which distance any repairs may be made within ten minutes, which by the present mode frequently occupies more than twice that time, exclusive of disturbing in some measure the line of road. By my method, the plate have a certain degree of play, which is absolutely necessary to avoid that breakage which too frequently takes place when they are fixed with nails and plugs.

The plates which I send have been fixed in stone blocks, and are nearly as rough as when taken from the sand. If I am favoured with any mark of the Society's approbation, I shall hold myself bound to transmit such further communications on this subject as may be required by them, or any person desirous of adopting my plan.

I am, Sir,

Your most obedient Servant,

CHARLES LE CAAN.

Llanelly, Carmarthenshire, May 12, 1806.

To C. Taylor, M.D. Sec.

SIR,

I HAVE considered the improvement made by you in the specimen exhibited of a new design of a tram-plate, and am

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Certificates were also received from Mr. R. JONES of Swansea, Agent to General Ward's Colliery; from Mr. JAMES BARNES, who formed the Mynther and Carmarthenshire rail road, and Mr. EDWARD MARTIN, of Morristen, an eminent Colliery, surveyor and planner of rail roads, all testifying the advantage of Mr. Le Caan's invention.

Reference to the Engraving of Mr. CHARLES LE CAAN'S *improved Tram-Plates for Rail-roads: Pl.* VI. *Fig.* 8, 9, 10, 11.

The Tram-plates, fig. 8 and 9, are fastened by means of a tenon and mortise A B, each having a correspondent bevel, just sufficient to keep the end from rising up, so that the head of one plate confines the end of the other; by this means, the workmen are obliged to form their road in right lines, and maintain perfect levels, as the mortise and tenon confines them to the required exactness necessary to make a perfect road: curves or any given segment may be formed with the same nicety, by having two bevel rails or plates made for such purposes.

Fig. 9. A side view or longitudinal section of the two plates placed on their stone blocks or sleepers C D, show two plugs in dotted lines, one bevel, the other perpendicular, cast in the stop-rail or plate, which is so called as it prevents the others from moving, and when taken up releases all those between the stop-plates; 25 yards of rail road made with these plates, may be taken up and replaced within ten minutes. The plugs in dotted lines are shown in their proper positions within the sleepers E F G.

The usual length of a tram-plate is three feet, the flanch or outside edge H, about one inch and half high, the sole or bed

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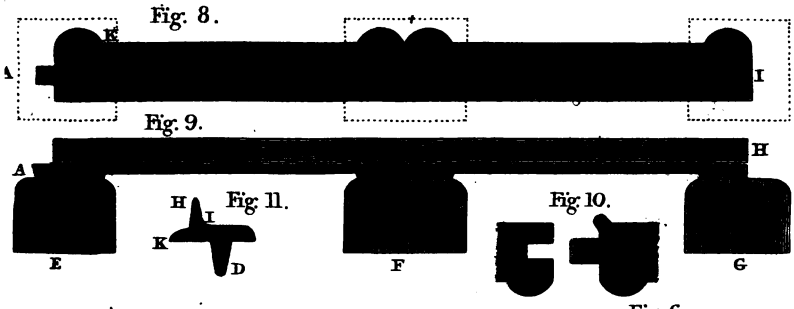
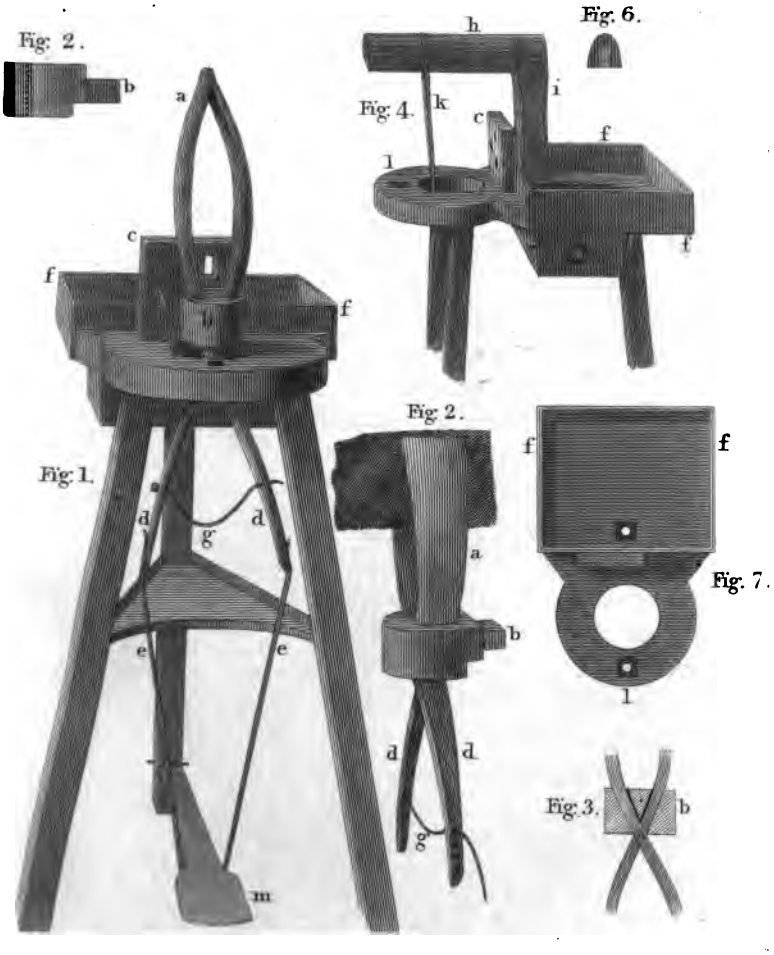
Mr. Charles Le Caan's Tram Plates.





Mr. A. Staffs Machine for Boot-closing.

C. Varley del.

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bed I, from three inches and a h
three-fourths of an inch thick
be varied according to circun
weight has been 14 pounds to
plate, the ends from which th
the tenons and mortises fasten,
inch thicker than the other par

Fig. 10. A B, Show the u
mortise, and the form of one

The diameter of the plug n
and three quarters, reducing
inches and a half, forming an
plate from which its projects
shoulder of the plug may not
prevent the plate from having
a small groove in the whole le
plug, to admit a wire to pass t
plug out if broken by any ac
pansion of water, in case of se

The blocks or sleepers, E F
are placed, should by no means
in weight, but should be heavi
the depth of the hole for
inches, and worked accordi
plug, for which purpose the
standard cast-iron guage; the
cast with the flanch or outsi
shown at fig. 8, to make the p

Fig. 11. Is a section of one
in which H shows the flanch
or sole on which the wheels
the plugs, K the projection t
plate lie firm on the blocks.

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GENERAL OBSERVATIONS.

The advantages of laying plates on the above principle, is obvious; the blocks being put in their places never sink below their intended level, the act of driving either nail or plug, (which requires a considerable degree of force, and too frequently destroys the level of the road) being here unnecessary. In the common mode of making rail-roads, from the irregularity of nails, particularly in forming their heads, few can be driven exactly even with the plate, and are perpetually obstructing the passage of the waggon; the workmen frequently not proportioning their holes and plugs to the hole in the block, also occasions considerable breakage; the exertion necessary to fix a rail or plate completely, is great, and numbers of plates, particularly when the iron is short or brittle, are broken near the mortices by missing the stroke of the hammer, which must be used with great force.

Advantage gained in laying my Tram-Plates in Comparison with other Modes.

	£.	s.	d.
Nails used in a Mile, 3520 of 3 in the pound, at 4d. per lb. - - - -	19	11	0
Nails lost or defective, computed at per mile -	1	0	0
Plugs with their loss - - -	6	5	0
By Breakage of Rails, average from experience	7	10	0
Lessened by labour in Block laying, calculated at only two-pence per yard - -	14	13	4
By Breakage of Blocks - - -	1	0	0
£.	49	19	4

This calculation does not take in annual loss of nails, and breakage of blocks, which is considerable.

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can be let down to shut up the ash pit or dish I, which can be drawn out when the side facings FF are pulled up. G a circular plate or cap, which slides so as to shut the chimney up close.

Fig. 2. The body of the stove with the slider A moved round to the back, and thus leaving the fire-place completely open.

Fig. 3. The ash-dish shown separate.

Fig. 4. One of the side facings taken out to show the figure H, which slides into a hole made in the corner of the stove to hold it.

A LETTER OF THANKS *and the* SILVER MEDAL *were voted to the Founder of this Society, Mr.* WILLIAM SHIPLEY, *in the year* 1776, *for his ingenious and humane contrivance for saving the Lives of Persons who fall overboard at Sea, and for presenting a Machine for that purpose to the Society, which is placed in their Repository.*

As this Invention hath not yet been published, and the Society consider it of too great utility to remain unknown, they have ordered it to be inserted in the present Volume, and an Engraving thereof to be annexed.

An Account of a FLOATING LIGHT *calculated to save the Lives of Persons who have the Misfortune to fall overboard in the Night from any Ship.*

GENTLEMEN,

IT is proposed, in order to make this float useful, that it be placed every night under the care of the officers on watch; that its lamp be frequently trimmed and supplied with

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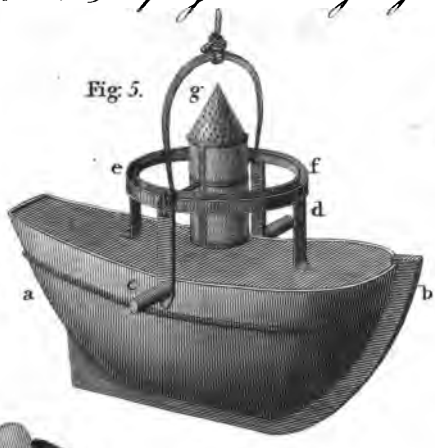
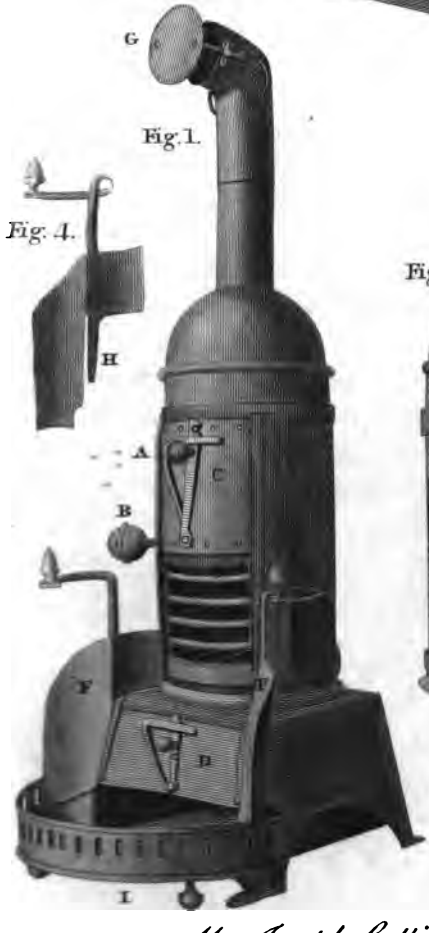
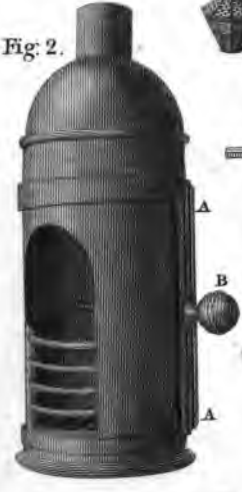
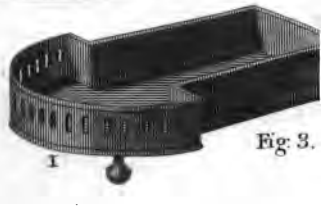
Mr. Wm. Shipley's Floating Light.









Mr. Joseph Collier's Ship Stove.

Varley del.

S. Porter

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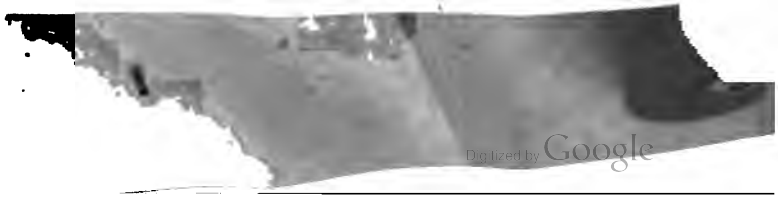
with fresh oil, and its wick moistened with oil of turpentine, in order that it may take fire with the least touch of a lamp or candle, and whenever the alarm is given of any of the sailors falling overboard in the night, the officer on watch may light the lamp in the lanthorn belonging to the float as expeditiously as possible, and let the float down by a small cord, wound upon an iron reel, into the water, till it has floated about one second of time, and the float is a little way out of the perpendicular of the small cord. He is then to secure the cord on the reel, to prevent its unwinding, and toss it overboard. The reel will sink down, and pull the line almost perpendicular, and thus it will not be liable to entangle the person when he swims to the float, who, when he has got hold of the handles of it, may move it very fast which way he will, only by striking his legs in the same manner as he does when he swims; and as the light of the lamp will be a certain guide for the person fallen overboard to find the float, so it will also direct them in the ship to find the manand float: And when the ship has tacked about, and is come to the float, then the following method is proposed to take up the man and float into the ship: viz. A lanthorn, with a rope ladder, may be let down by a cord from the ship, till a cross-bar below the lanthorn touches the water, which may be seen by them in the ship by means of the light from the bottom of the lanthorn, and thus the man in the water may lay hold of the cross-bar, and fix his feet on one of the steps of the rope ladder, and he may then lay hold of the iron bar or handle of the float with one hand, and hang it on the hook of the rope, above the cross bar, which being done, the man and float may be both safely lifted into the ship.

Reference



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Reference to Mr. Shipley's Floating Light, Pl. 7, Fig. 5, 6, 7.

Mr. Shipley's floating light consists of a hollow vessel in the form of a boat, made of tinned iron plate, *a b*. Fig. 5, Plate 7, the joints of which are carefully soldered, so as to keep out the water. The boat is 27 inches long, 13 broad in the middle, and 12 deep, and is sufficient to support a man in the water. From the gunwale of the boat, on each side, projects a handle *c d*, soldered fast to it for the man to hold by.

e f is a metal ring connected with the boat, by four upright pieces, within which is another smaller ring, turning on pivots, fastened to the ring *e f*, in the direction of the *boat's* length; the internal ring supports a small lanthorn *g*, by an axis which passes through it, and is pivoted into the ring at each end, in the direction of the boat's length. By means of these rings the lanthorn will remain in a vertical position, independent of the boat's motion.

On the first alarm of a man falling overboard in the night, the candle is to be lighted, and the machine lowered into the sea by the rope; if the man should be at a small distance from the ship, he may, by means of the rope, be taken on board immediately on his reaching the machine, if not, the rope may be secured on the iron reel, to prevent its unwinding, and cast off, and the light will direct the man where to find it, and holding fast by the two handles it will support him in the water.

Fig. 6. *h* is a rope ladder, having a lanthorn attached to it, as well to direct the person in the water to the rope ladder, as to enable the persons who lower the ladder to let it down till the cross-bar *k* reaches the water; *l* is a hook to hang the floating light upon. Fig. 7. *m* is the reel for the line, by which the floating-light is to be lowered.

To the Society of Arts, &c.

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the street, with such a machine, it would be also very troublesome.

If the brush is made to fill the flue, which ought to be the case, a substance of an elastic nature has not power sufficient when the brush is forty or fifty feet up, especially where there are sharp turns in the flues; the force applied to send the brush up is principally spent in friction on the sides of flues, and of course would soon cut through any flexible substance that combines the whalebone, or other elastic substance used.

My next attempt was to join elastic rods together by screws in the joints, but this plan would not do in passing sharp elbows, as the joints would be strained, and soon unfit for use, and a danger of the joints slipping or breaking, which would leave the brush in the flue.

I then thought of the simple portable machine, I have sent for the inspection of the Society; its cheapness, durability, and power of execution, will, I hope, recommend it. I think with perseverance it will abolish the practice of climbing boys; I have used it in several lofty chimnies, and am convinced it may in time become general. I have also sent a rod and curtain that may be fixed to any opening of a chimney-piece, from six inches to five feet, without using nails or forks in the common mode, to the injury of the wainscot or chimney-piece.

My method of working the machine is, by first putting up the brush, then pressing forward one tube after another as strung upon the rope, till the brush meets with an elbow in the flue; then it is necessary to tighten the rope by pulling it under the feet, or by means of a small pulley, and putting in one of the small screws to pinch the rope; then make a fresh push, and by shifting the two screws, the one to relieve the

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the other, it will pass the elbow and possess sufficient stiffness to allow the brush to be forced forward to any height.

I have tried the heath and hair-brushes, and find, that if the flue is well filled, it does not require so hard a substance as heath, as it brings down the mortar with the soot. The brushes of hair, and those formed from the article of which carpet brooms or whisks are made, I think will answer best for general use.

This is to certify, that Mr. GEORGE SMART, of Camden Town, by means of a machine of his own invention for sweeping chimnies, has made two experiments on my hall and parlour chimnies, to ascertain the practicability of raising the machine through their various windings. The first of these flues measures upwards of fifty feet from the hearth, and the operation was performed with apparent ease, sending down a quantity of soot, together with some wet mortar, although the flue had been recently swept by a regular chimney-sweeper. The other from the hearth measures sixty feet, and although there are no less than three elbows in it running in opposite directions, (as the *boy* informs me), the operation was performed within nine minutes.

JOHN TROTTER.

Soho-square, May 2, 1803.

Certificates were also received from Mr. H. W. DIETRICHSEN, of Pratt-place, Camden Town; Mr. CHARLES MILL, No. 4, Gloucester-place, Camden Town; Mr. JOHN MASON, and the Rev. JEREMIAH JOYCE, of Camden Town, testifying that they had seen Mr. Smart's machine at work, and that they approved thereof.

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SIR,

I HAVE the pleasure to inform you, that my machine for sweeping chimnies succeeds far beyond my expectation, and that I am not able to attend to one-half of the orders I could have for its use.

His Royal Highness the Prince of Wales, has directed that the chimnies at Carlton-house, also those at the Pavillion, shall for the future be cleansed by my machines. I have also had orders to send to different parts of the kingdom my machines ready-made, where they have been the means of providing a comfortable subsistence for poor persons not capable of other business.

The price of a machine to ascend 60 feet, including rod, curtain, extra brush and box, is 4*l.* 14*s.* 6*d.*

There are two particular advantages attending my machines; namely, that of sweeping a great number of narrow flues which no child can get up, and that of extinguishing chimnies when on fire, by placing a wet cloth over the brush, and forcing it up the chimney.

The construction of the machine is so fully shewn by the description and engraving of it in page 256, of the 23d volume of the Society's Transactions, that it will be unnecessary to say more upon the subject.

I am, Sir,

Your humble servant,

GEORGE SMART.

Ordnance Wharf, Westminster-bridge.
Dec. 21, 1807.

To C. TAYLOR, M. D. SEC.

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The SILVER MEDA
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opinion on it.

No. 14, *Crescent, Kingsla*
TO C. TAYLOR,

SIR,

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using in the presence of his Lordship the Bishop of Durham, at the Military Hospital, Westminster, on the 11th of June 1803, and at the Jennerian Society, in Salisbury-square, Fleet-street, on the 22d of the same month, and in the same year;—a certificate of which signed by the gentlemen who were present, I had the pleasure of sending you. I have also sent three lengths of the rod, (the same as those which were used at the above places,) in order to enable the Committee to judge with greater ease of the construction. Permit me nevertheless to observe, that the principle of my rod is so simple and secure, that it may be used in almost every chimney with safety, either by the maid servant, or a boy of twelve years of age; it is calculated both for private and public use, and a stranger to the machine who used it at the Military Hospital, declared he could sweep any chimney with it, the plan was so good. It will also sweep German and other stove pipes, and flues of almost every description. If the gentlemen of the Society will do me the honour to take the machine into their consideration, I will wait on them by hearing from you, and explain further particulars.

I am, Sir,

Your obedient Servant,

JOSEPH DAVIS.

No. 14, *Crescent, Kingsland-road, March* 18, 1806.

To C. TAYLOR, M. D. SEC.

Certificate of Approbation of Mr. DAVIS's *Machine.*

We hereby certify, that we were present and did witness the trial of Mr. Joseph Davis's machine for the cleansing of chimnies,

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to expand to the width of the flue, and to bring down with them in their return all the soot which adhered to the sides of the flue. As the machine is drawn down, the rods are separated one by one by means of the key, and laid upon the hearth till the brush part is brought down, which is then closed and laid with the rods.

The usual precautions must be taken of placing a curtain before the fire-place, to prevent the soot whilst falling from flying about the room.

JOSEPH DAVIS.

TEN GUINEAS *were this Session voted to Mr.* JOSEPH DAVIES, *No.* 14, *Crescent, Kingsland-road, for his Invention to secure the Pannels of Doors and Window-shutters from being cut out by House-breakers.*

The following Communications were received from him, an Engraving is annexed, and a Model is placed in the Society's Repository for the Inspection of the Public.

SIR,

I HAVE for some time considered that it would be of great benefit to the public, if a plan could be adopted to prevent the pannels of shutters or doors being cut out by house-breakers; and having tried a great number of experiments, I have at length succeeded in accomplishing the one I have the honour of forwarding to the Society for the Encouragement of Arts, &c.

This improvement consists in introducing tempered steel

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Mr. Mendham's Escapement

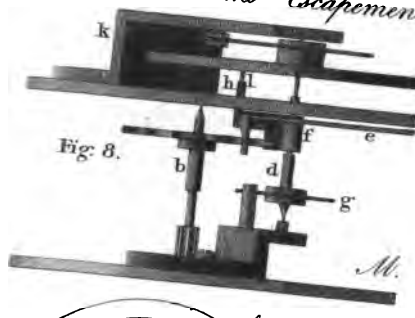

Fig: 8.

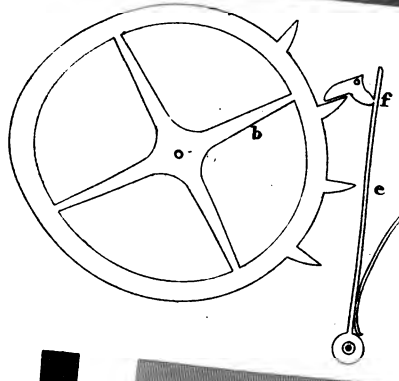

Fig: 6.

Fig: 5.

Fig: 7.

Mr Davis's Pannels.

Plate II.

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steel wires through the pannels and stiles at the distance of three inches, thereby not only making a door or shutter far superior in strength, but calculated to defy the attempts of the house-breaker in taking out a pannel. This improvement, though so far superior to any hitherto known for appearance and utility, will be attended with less expence. I have submitted the above plan to Messrs. Paynters, Coleman-street, likewise Messrs. Moffatt and Co. Paternoster-row, and to several gentlemen in that line of business, who all do me the honour to say, that it far surpasses any thing of the kind, that they have ever known or conceived, and that it will completely answer the purpose.

I have also sent the machine on which I bored the pannel, conceiving it to be an additional recommendation; with this machine, a boy may with ease bore the shutters, &c. which other ways might be difficult for a man to accomplish.—I have the pleasure most respectfully to subscribe myself,

SIR,

Your very humble Servant,

JOSEPH DAVIS.

No. 14, *Crescent, Kingsland-road,*
April 14, 1807.

To C. TAYLOR, M. D. SEC.

CERTIFICATE.—We hereby certify, that Mr. Davis's improvement on doors and shutters, to prevent the pannels from being cut out by house-breakers, is the best that we have ever seen; and we are of opinion, that its being known will be an advantage to the public, and do therefore recommend

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mend it to the Society for the Encouragement of Arts, Manufactures and Commerce, for their consideration.

F. PAYNTER, and Co. Coleman-street.
E. COLEBACH, Minories.
J. TEASDALE, Paternoster-row.
W. ROLFE.

April 22, 1807.

Reference to the Engraving of Joseph Davis's Invention for securing Window and Door Pannels. Pl. 8. *Fig.* 5, 6, 7.

Fig. 5. Represents a wooden pannel made in the common way, the dotted lines show the situations of the tempered steel rods within the pannel, the holes through which the rods were introduced on one side being closed up.

Fig. 6. Shows a section of the same, the small dots in the engraving, denoting the place of the rods.

Fig. 7. Shows the instrument on which the pannels are laid to be bored. The borer passes through the holes L M of the two upright pieces which keep the borer in a straight line to act upon the pannel laid upon the frame N.

The SILVER MEDAL *of the Society was this Session voted to Mr.* S. MENDHAM, *Counter-street, Borough, for a Watch Escapement.*

The following Communication was received from him, an Explanatory Engraving is annexed, and a Model is preserved in the Society's Repository.

SIR,

I BEG leave to lay before the Society, a model of a new escapement, the principle of which is, that the balance acts without

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without friction, and the movement in itself very simple; the impulse is given without jarring, the inequality of power through the train, has no perceptible effect on the balance; and no additional weight, however great, can produce more than a regular and gentle increase of impetus on the balance.

I remain, Sir,

Your most obedient Servant,

S. MENDHAM.

7, Counter-street, St. Margaret's-hill, Borough, Sept. 21, 1805.

To C. TAYLOR, M. D. SEC.

SIR,

HAVING attended the Committee upon Mr. Mendham's escapement, I think it a justice due to a man of genius, to give my opinion further upon it.

In viewing mechanical improvements, we should not confine our ideas to their present properties, but should consider what improvements the principle will admit of.

As the principles of Mr. Mendham's escapement, and that of Mr. Mudge's, which obtained a bounty from government, are much the same, I shall compare the one with the other.

The impulse given to the balance without friction, is exactly the same as Mudge's. The remontoir is bent up by the maintaining power in a similar way to that of Mudge's, but from the form of the pallet, which is a plain surface,

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surface, it is not so perfect. Mudge's, from the form of the pallet, bends the remontoir always to the same place, the other is bent higher or lower according to the force of the maintaining power, but by forming the pallet like Mudge's it would render them alike in that respect. The only other objection is the spring detent that detains the wheel, when it drops from the pallet of the remontoir; it is the same as that of a detached escapement, consequently exposed to the whole force of the maintaining power. To compensate for these objections, the arc of vibration is not limited like Mudge's, which is of great importance, and having only one remontoir, it is more simple. It is, therefore, superior to Mudge's in having only one remontoir, and being unlimited in the arc of vibration, it is superior to the detached escapement in giving the impulse without friction.

I am, Sir,
Your very humble Servant,
THOMAS RAMSAY.

Islington, Feb. 11, 1807.

To C. Taylor, M. D. Sec.

Reference to the Engraving of Mr. S. Mendham's Escapement. Pl. 8. *Fig.* 8, 9, 10.

In the escapement referred to, there are two principal peculiar properties in the invention, both which I consider superior to any thing of the kind laid before the public; first, the balance is kept in motion without any friction whatever, and in a manner so simple, that even movements of inferior workmanship must go with great accuracy.

Being not in this line of business, or acquainted with any persons in the trade, where I might have had an opportunity

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but so close home to the centre of the spindle, that it has no power to pass it of its own accord; the pin *h* referred to, is fixed to the top extremity of the pallet *c*, and rises perpendicularly through the plate *a* some way above the surface.

The balance *i* is fixed on the centre of its spindle, principally on account of equalizing the weight, besides which it is the most convenient to be so; it is supported between the plate *a*, and the cock *k*, precisely over the spindle *d*, consequently the action of each is in the same arch, and the connection is between the pin *h* of the pallet, and the pin *l* of the balance, (a pin fixed in the balance at the same distance from its centre as the pin *h* is from the centre of the spindle *d*, and sufficiently long to touch the pin *h* sideways,) there is therefore no friction whatever between them.

Having mentioned the different parts of the escapement, I shall proceed to explain its action. The immediate course of vibration is from the spring *g*, the balance spring is so placed that the pin *l* of the balance stands near the pin *h* of the pallet; it is to be remembered that the tooth of the wheel rests on the pallet during the vibration of the balance, so that when the balance is put in motion, the pin *l* comes in contact with the pin *h*, which stands perpendicularly almost imperceptibly fine, and carries it back; as soon as moved, the tooth of the wheel gives it an extra assistance of about one-fifth of a circle, passes and lays the next tooth on the lock; on the return of the balance, the spring *g* applies all its power in urging the balance forward till it comes to the stop, the balance then maintains its motion, and the small pallet *f* having unlocked the wheel, the tooth falls again on the great pallet *c*, and waits the return of the balance.

The balance carrying the piece *h* back, forms a most admirable

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this escapement, may be co
a detached nature.

Fig. 9. Represents the a
that the arm and pin *h*, a
more distinctly.

Fig. 10. Shows the bala
locking and unlocking.

The SILVER MEDAL *of th*
to Mr. WILLIAM HA
opposite the Dispensary,
long and short Arcs of V

The following Communica
explanatory Engraving
the Invention is preserv
See Plate 9. *Fig.* 1, 2, 3

SIR,

THE equalization of t
vibrations of the balance

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given to rise much discussion, I beg leave to offer for the approbation of the Society, three different modes of obtaining this end. The first method is by a straight spring placed edge-ways across the diameter of the impellent pallet *a*, fig. 2 and 3, and screwed at the end opposite to the direction of the wheel, on its approach towards the centre of this pallet; at the other extremity of this spring is a flat face, or curved surface, to receive the approaching tooth of the escape wheel, which gives the impulse; this spring acts between two pins placed in the pallet near its end. By reducing this spring to a certain degree of strength, so that it may yield a little to the force of the wheel in giving the impulse, the different vibrations will be performed in the same time; but the proper degree of strength can only be determined by repeated trials. This method possesses besides, this farther advantage, that the acting surfaces are not so liable to be injured by the drop of the wheel upon the spring, as upon a solid surface, nor the vibrations of the balance so much disturbed by the impulse. The second method is by a straight spring *b c*, fig. 1 and 4, screwed to the under part of the cock, placed edgeways and diametrically over the cylindrical spring, and having a piece cut out to clear the arbor of the balance. This straight spring is at one extremity fastened to the end of the pendulum-spring, and, at the other extremity, its elasticity is reduced so as to yield a little before the pendulum-spring operates; on the opposite of the cock, where the spring is screwed, is fixed a stud *d* projecting downward, and having a slit to admit the small piece at the end of the spring *b*; on each side of this slit is an adjusting screw *e e*, whose points face each other, and are placed so as that the spring may move equally between them from its point of rest. The action of the spring between

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between the adjusting screws, requires to be somewhat less than the angle of escapement. Let the balance be made to vibrate, so that the straight spring may move up to the adjusting screws upon each side, and no farther, being weaker than the pendulum-spring, its exertion will be less; hence the time of the vibrations will be prolonged, but as they increase, the exertion of the pendulum-spring will commence and progressively accelerate them, and this acceleration will always be in proportion as the exertion of the pendulum spring is to the action of the straight spring between the two adjusting screws. Thus it will always counteract the accelerating effect of the escape-wheel in the small arcs of vibration, so that the whole of them shall be performed in the same time. The third method is by connecting a piece of short spring-wire to the pendulum-spring, by a small piece *f*, fig. 5 and 6, with two holes, and pinning the two springs together about half a turn from the stud of the pendulum-spring, and clamping the other end of the short spring at its natural point of rest to a sliding piece, *g*, which projects out from the pendulum-spring stud. By this manner of fastening, both springs will act together, and each will retain their natural point of rest; but by moving the sliding piece, which clamps the end of the short spring, and placing the spring a little on the strain, in opposition to each others exertion, the point of rest of both springs will be destroyed. Thus by producing this counteracting force in the two springs at the lowest point of vibration, the accelerating effect of the escape wheel upon the balance in the small arcs of vibrations will be corrected, thereby the whole of them will vibrate in equal time.

I am, Sir,

Your obedient humble servant,

No. 13, St. John's-street, Clerkenwell. WILLIAM HARDY.

To C. Taylor, M.D. Sec.

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Extract from Captain William Brown's Letter, addressed to Mr. John Nichols, Millpond-bridge, Bermondsey.

Respecting the chronometer which I purchased from Mr. William Hardy last year, the jolting of the coach in the conveyance to Liverpool, altered its rate of going to 34″ slow, which rate it continued so exactly, that in making Cape De Verd, on the coast of Africa, (the longitude of which has been correctly ascertained) in 24 days from Liverpool, and carefully measuring my distance to the Cape, I could not discover it to have deviated from that rate, say 34″ slow, not one second in the whole time; and I have every reason to believe, that it continued the same rate until my misfortune, when it got immerged in sea-water, having lost my ship on a shoal five or six leagues from the Riopongas, this dangerous bank not being laid down correctly, nor the latitude nor longitude given in order to avoid it.

Liverpool, April 26, 1807.

To Mr. W. Hardy.

The Silver Medal *of the Society was this Session voted to Mr.* Henry Ward, *of Blandford, in Dorsetshire, for a Compensation-pendulum for a Clock or Time-piece.*

The following Communication was received from him, and an explanatory Engraving is annexed.

A *complete Pendulum, and Drawings thereof, are placed in the Society's Repository.*

SIR,

Herewith I send you a new compensation-pendulum, which I beg you will lay before the Society of Arts for their

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their inspection. I trust their liberality will be equal to the advantages that may be seen to result from it, together with their consideration of the pains I have bestowed in making it. It has me cost much labour, time, and expence, indeed, it has occupied almost the whole of my attention for the last nine months.

If any objections should be made to it, I will endeavour to answer them, and make any further experiments required.

I am, Sir,

Your obedient Servant,

HENRY WARD.

Blandford, March 8, 1806.

To C. Taylor, M. D. Sec.

Reference to Mr. Ward's Compensation-Pendulum.
Pl. 9. *Fig.* 7, 8.

Fig. 7. *h h i i.* Are two flat rods of iron or steel, about half an inch wide, and an eighth of an inch thick. *k k* Is a rod of zinc interposed between them, and is nearly a quarter of an inch thick. The corners of the iron rods are bevelled off, that they may meet with less resistance from the air; and it likewise gives them a much lighter appearance. These three rods are kept together by means of three or four screws *l l l l*, which pass through oblong holes in the bars *h h k k*, and screw into the rod *i i*. The rod *h h* is connected to the one *k k* by the screw *m*, which I call

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the adjusting screw. This screw turns in the rod *h h*, passes through the zinc rod *k k*, and screws into the iron rod *i i*. The rod *i i* has a shoulder at its upper end turned at right angles, and bears on the top of the zinc rod *k k*, and is supported by it. It is necessary to have several holes for the screw *m*, in order to adjust the compensation. See fig. 8.

Now it is evident, that if any degree of heat or cold be applied to this compound rod, that the one of zinc expands and contracts as much as the two iron ones together; the distance from the point of suspension to the centre of oscillation must remain the same.

In proportioning the length of the rods, I made use of Mr. Smeaton's table of expansion of metals, in the 48th Vol. of the Philosophical Transactions: where he shews, by experiments made with a pyrometer, that the expansion of iron is to that of unhammered zinc, with the same degree of heat as 151 to 353, and to that of zinc hammered, half an inch per foot, as 151 to 373. This great expanding property of zinc renders it in theory extremely fit for the purpose of compensation in a pendulum, and I was desirous of knowing if it would answer in practice, and likewise the exact proportion that was requisite to answer the intended purpose.

I made two regulators whose pendulums were composed of iron and zinc, as above described, with this difference, however, that one had a detached scapement of a particular construction; the zinc rod was not hammered, the ball of a lenticular form, and weighed twenty pounds, its arc of vibration nearly five degrees. The other had a simple remontoiring scapement, the zinc rod was hammered half an inch per foot, the ball, of a spherical form, weighed forty six pounds, and vibrated two degrees and three quarters.

These

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These regulators were both placed in the same room, and their cases firmly fixed to the wall; the pendulums were suspended from a stout brass cock, screwed to the back of their respective cases. In the inside of each case, and immediately behind the pendulum rod, was hung a thermometer, for the purpose of comparing the degrees of heat. I adjusted them to mean time nearly by corresponding altitudes of the sun. After having compared them together for several days, I found that the one which had the hammered zinc rod went somewhat faster when the air of the room was heated by a fire in the grate than the other did. Hence I concluded that the difference of expansion of hammered and unhammered zinc was greater than Mr. Smeaton made it, at least it appeared so in this instance.

But to determine whether the length of the hammered zinc rod was accurately proportioned to that of the iron ones, I wished next to prove, without waiting that length of time that nature would require to produce a sufficient alteration in the temperature of the air, I proceeded to make the following experiment: I caused to be made a tin tube six feet long, and two inches and a half diameter at its larger end, from whence it gradually tapered to the other, which was only half an inch diameter. Within the case, and as far from the pendulum as possible, I placed this tube; the smaller end was carried through a hole in the top of the case, and projected a few inches above it. In the lower end of the tube was inserted the nozzle of a lamp, and immediately under it, in the bottom of the case, was a hole of an inch diameter to supply the lamp with air. By this means the tube would communicate as much heat to the internal air, as to raise the thermometer about thirty-five degrees.

Previous to the lamp being put in the case, I made both

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pendulums vibrate exactly together, and after an interval of twenty-four hours, the one with the hammered zinc rod had gained, as near as I could judge, one tenth of a second. The mean height of the thermometer was fifty-three degrees. I now lighted the lamp, and in about four hours every part appeared to be thoroughly heated, and the thermometer arrived at its maximum, which was eighty-eight degrees; at this point it continued with little variation. While the heat was increasing I found the motion of the pendulum was accelerated. I again made them beat exactly together, and in about ten hours after, the heated pendulum had gained one second; the thermometer in the other case continuing nearly the same. The lamp was then taken out, and as soon as the parts were cooled, and both thermometers shewed the same degree, I adjusted the beat of the pendulums as before, and, at the end of twenty-four hours, I found the pendulum that had been heated kept precisely the same rate as it did before the experiment was made.

By this experiment the zinc rod was evidently too long, and that b y a considerable quantity. The pendulum was then taken down, to have more holes made for the adjusting screw, and after many repeated trials with the lamp and tube, as before, I found the length of the zinc rod to be 22 inches, and consequently the length of the iron ones together $39{,}2 \times 22 = 61{,}2$ inches, or, the expansion and contraction of iron to that of zinc hammered, half an inch per foot, as 151 to 420.

Having thus far satisfied myself with the hammered zinc rod, I proceeded to make similar trials with the one that was unhammered; in doing which a circumstance occurred that I cannot account for, that when the air in the case was rarified by means of the lamp and tube, the arc of vibration

vibration would be about half a degree less than it was before the lamp was applied, which is directly contrary to what I should expect would have taken place. I afterwards found that the other pendulum was affected the same way, but in an extreme small degree, which, without doubt, was in consequence of the ball being much heavier, and vibrating a smaller arc. In taking the rate of the clock when the lamp was in the case, I at first computed from theory the error that would arise by such a dimunition of the arc, and allowed for it accordingly; but doubting whether the unlocking of the swing wheel might not form a decrease of velocity in the pendulum, and have a greater tendency to retard its motion, I therefore thought the experiment would be rendered more accurate if the maintaining power was increased until the arc of vibration should be the same. After several trials I found the length of the unhammered zinc rod to be about twenty-nine inches, which agrees pretty nearly with Mr. Smeaton's experiments; that is, in regard to the relative expansion of iron and unhammered zinc.

The zinc rod of the pendulum, which I here send to the Society of Arts, was hammered three quarters of an inch per foot; and by making experiments with it as I had done with the other two, I found the length of it to be twenty-two inches, which is exactly the same length as the one that was hammered half an inch per foot, so that it seems nothing is gained after hammering it to a certain degree; but I cannot think that any rule can be laid down to enable us to judge of the degree of expansion that will take place with a determinate increase of heat, from the quantity that is extended by the hammer; much depends on the degree of curvature and polish of the stake and hammer, and probably on the heating of the rod at the time; for

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for it is necessary to heat it a little hotter than boiling water, otherwise it will crack in hammering.

In all these experiments it is to be understood that the ball of the pendulum was suspended by its center; but if the ball be made to rest on its lower edge, the expansion and contraction of it must be taken into consideration.

It has been the opinion of some mechanists that zinc is an unfit substance for a compensation-pendulum, because they have thought it too soft for the purpose, and that after being heated or cooled to a considerable degree, it does not return to its original dimensions. If that was really the case, no doubt but it would be a general one common to all metals in a greater or less degree; but from the experiments and observations I have made on zinc pendulums, I am fully satisfied there is no foundation whatever for such an opinion. Some time in the latter part of last summer, I however noticed a circumstance that made me doubt the matter—for when I first used any zinc pendulum, I never could bring the clock to keep the same rate two days together, but that it was continually retarded, whether I used the lamp or not; and had I not before observed a similar effect on a lever pendulum that was made of brass and steel, I should have ascribed the cause wholly to the softness of the zinc rod; but by constantly comparing its daily rate with one that had been going a longer time, I found this retarding property gradually wore off, and in less than a month would become quite settled to the rate that it would afterwards keep. By subsequent experiments with the lamp too, I have constantly found that all the pendulums I have hitherto tried kept precisely the same rate, both during the time they were heated (provided they were properly adjusted) and afterwards,

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terwards, as they had done before. The cause of this retardation appears to me to be, that the points of contact of the different pieces, which compose the pendulum, are more closely connected after a little time than they are at first, that is, those points of contact do, by the weight of the ball, yield to each other in a smaller degree, until they get a broader bearing.

The advantages of this pendulum are, 1st, that from its simplicity it will never fail to have the desired effect. 2ndly, That no extraordinary care is requisite in executing it. 3dly, That the compensation may be increased or diminished with the greatest ease, without stopping the clock more than a minute, by making fast one of the screws that keep the rods together whilst the adjusting screw is removing, taking care to release it again afterwards; and, 4thly, That it can be manufactured for less expence than any other compensation-pendulum hitherto published.

N. B. The compensation of this pendulum which I now send to the Society of Arts is properly adjusted, at least very near the truth. The holes for the adjusting screw are made at such a distance from each other, that by removing the screw one hole, it will produce an alteration in the going of the clock of about a quarter of a second per day with a change of thirty degrees of Farenheit's thermometer.

SIR,

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SIR,

PERMIT me to state to you the observations I have made since my compensation-pendulum was laid before the Society.

The regulator, with the hammered zinc rod, and ball of forty-six pounds weight, was firmly fixed to a brick wall at the top of my house. The adjustment of the length of the rods, by means of a lamp, was repeated as before. There was, however, an alteration necessary to be noticed; the ball of the pendulum rested on its lower extremity, instead of being suspended by its centre. I prefer this method, as being less liable to error if the rods should be affected by heat or cold, quicker than the ball. The length of the zinc rod, as ascertained by the lamp, was now found to be $20\frac{1}{2}$ inches.

The clock was then set to mean time, and suffered to go without alteration; the result is exhibited in the following table.

1806	Error of Clock at time of observation.	Number of Days between the Observation.	Daily rate
March 21	0″ 0	18	× 0″, 15
April 8	× 2, 8	32	— 0, 18
May 10	— 8, 7	16	— 0, 80
26	— 21, 5	26	— 1, 10
June 21	— 50, 0		

Increased the compensation for heat and cold, 6 holes $= 4\frac{3}{4}$ inches, or, the length of the zinc rod 25 inches. The clock was again set to mean time.

July

Fig: 1.

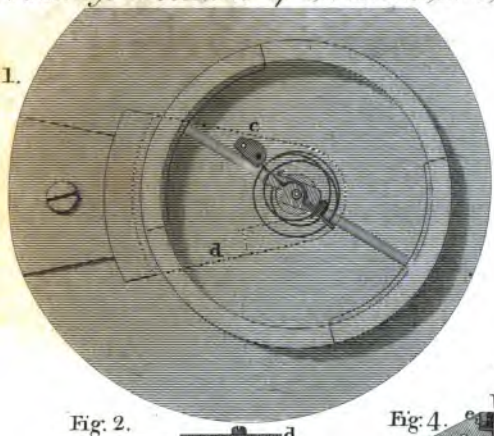

Fig. 2.

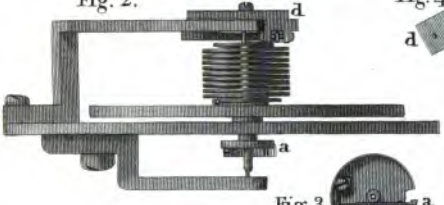

Fig. 3.

Fig: 4.

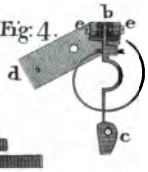

Fig: 5.

Fig: 6.

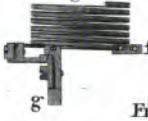

Fig: 9.

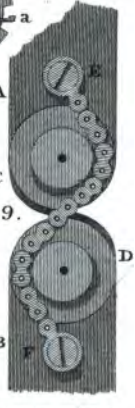

Fig: 11.

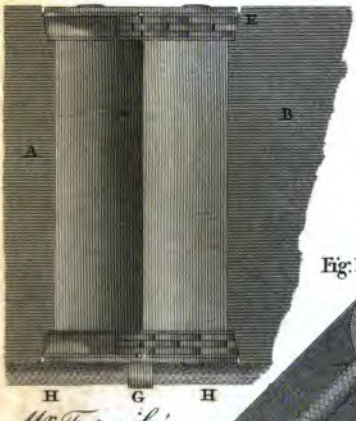

Fig: 10.

Mr. Furniss' Air Tight Door Hinge.

Fig: 7.

Fig: 8.

Mr. Henry Wards' Compensation Pendulum.

C. Varley lith.

S. Porter sculp.

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July 1	0″, 0	26	— 0″, 36
27	— 9, 3	13	— 0, 21
Aug. 9	— 12, 0	7	— 0, 31
16	— 14, 2	28	— 0, 34
Sep. 13	— 24, 0	12	— 0, 80
25	— 35, 5	22	— 0, 84
Oct. 17	— 52, 1		

Although a thermometer was attached to the clock, I could not from a necessary attendance to business register it regularly; the difference of its height in March and June may be taken at about 22 degrees, and in July and October 14, without much error.

On comparing it with the rate of the clock, the compensation, in the latter case, appears nearly as much too great, as it was in the first too small. The true length of the zinc rod ought to be about 23 inches.

The length of the zinc rod, thus ascertained, is $1\frac{3}{4}$ inch more than the experiment by the lamp makes it; indeed, I have always suspected there might be some error in that experiment, on account of the length of the arc of vibration being affected by it.

Having no means of finding the time accurately but by equal attitudes, I could not get so many observations as might be wished. I trust, however, these will not be found altogether useless.

I am, Sir,

Your obedient Servant,

HENRY WARD.

Blandford, Oct. 21, 1806.

To C. Taylor, M. D. Sec.

Ten

TEN GUINEAS *were this Session voted to Mr.* MARTIN FURNISS, *No.* 128, *Strand, for a new Air-tight Door Hinge.*

The following Communication was received from him, and an explanatory Engraving is annexed.

A Model of the Invention is placed in the Society's Repository.

SIR,

THE model I have herewith sent is my invention. I beg leave to lay it before the Society for the encouragement of Arts, Manufactures, and Commerce, in the hope that they will be pleased to examine it, and find it worthy of some mark of their approbation. It is a model for putting together the joints of a folding screen, so as to fold in either direction without admitting the smallest quantity of air; it may likewise be appropriated to hanging of doors.

I am, Sir,

Your humble Servant,

M. FURNISS.

No. 128. *Strand, London, Oct.* 15, 1806.

To C. TAYLOR, M. D. SEC.

A Certificate from Messrs. WILSONS, cabinet-makers in the Strand, testified that Mr. M. Furniss's model for screens or doors, is his own entire invention, and has been executed by them on a high-folding screen for a lady in Baker-street, Portman-square.

Reference

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Reference to the Engraving of Mr. Furniss's Air-tight Hinge for a Door or Screen.

Fig. 9. A plan of the joint: A B, two sides of the screens with circular ends, joined by a piece of leather reaching from top to bottom fastened at C, and wrapping (like the letter s) partly round the curve of one fold of the screen, and partly round the other to D, where it is also fastened: E F, a chain formed of brass plates rivetted together, winding round in a groove from off one fold of the screen on to the other, the contrary way to the leather, and thus mutually keep each other stretched tight, the chain winding on when the leather winds off, and vice versa; thus they move smoothly round one another. G Fig. 10, a piece of brass (left out in the last figure in order to shew the chain) screwed to the centre of each curve of the screens which forms the hinge, and by keeping the folds of the screen at their proper distance secures the easy action of the chains and leather, and prevents their being over-stretched. H H, a line of green twist fastened along the bottom of the screens, and passing through a staple on the joint at G, serving to keep the screen air-tight on the floor.

Fig. 11 is an elevation shewing the top and bottom joints, with the same letters of reference.

The

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The GOLD MEDAL *of the Society was this Session voted to Mr.* F. C. DANIEL, *of Wapping, for his Apparatus to secure Persons from sinking in Water, or to act as a Life Preserver when Shipwrecked.*

The following Communication was received from him, and an explanatory Engraving is annexed.

One of the Machines is preserved in the Society's Repository for public Inspection.

SIR,

I HAVE taken the liberty of sending one of my Life Preservers, and am proud to say, they have realized the name; and I shall feel myself obliged if you will cause it to be brought before the Society for their approbation. I beg to say, Sir, though I have given it publicity, it has never been before any committee.

I have inclosed a copy of a letter, which I received from the only surviving officer of the Alert private ship of war, and, independent of that document, I have had information from respectable authority, that the machines have saved several lives.

It is not, Sir, a pecuniary reward I look for, although I have sunk near 1500l. in the undertaking; yet, I must confess, to have the sanction of the Society of Arts would be highly flattering, and the world from that moment must be convinced of their utility.

I have the honour to be, Sir,

Your obedient Servant,

F. C. DANIEL.

Wapping, Oct. 22, 1806.

To C. TAYLOR, M. D. SEC.

Copy

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Copy of a Letter from Mr. GEORGE WILLERS, *late Surgeon of the Alert, Private Ship of War, lost off the Western Islands.*

SIR,

I AM happy in having it in my power to say, I owe my life to your invaluable invention, the LIFE PRESERVER; and the circumstances relative thereto, are as follow :—I shipped as surgeon on board the Alert, private ship of war, mounting 18 guns, and 98 men, commanded by James Desormeaux, esq. belonging to Messrs. Wright and Birch, Walbrook. We sailed for Falmouth, April 1805, and, after cruising five months, on the 22d of September, we unfortunately struck on a rock in the Western Islands, and the ship went to pieces in five minutes ; at that time we had eighty-four men on board : I witnessed the loss of every officer, six in number, and sixty-four foremast men ; thirteen of the crew were saved, by clinging to pieces of the wreck, spars, &c. which drifted from the wreck ; and I have the happiness to say, by possessing one of your Life Preservers (though I cannot swim,) I was supported for some time, the sea running mountains high, but providentially a large Portuguese boat put off to my assistance, being then near a mile from the shore ; and I was thus saved by the hands of Providence, and your invention, from a watery grave.

I beg, Sir, you will permit me to acknowledge how much I feel myself obliged to you ; and you are at full liberty to make this case known for the benefit of mankind.

I am, Sir,
Your most obedient Servant,
G. H. WILLERS.

Kennington, Aug. 2, 1806

To F. C. DANIEL, Esq. Wapping,
Inventor of the Life Preserver when Shipwrecked.

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SIR,

MR. George Willers, late surgeon of the Alert, private ship of war, and whom I succeeded as a surgeon in Mansion House-row, Kennington, in April 1807, went, as I have been informed, again to sea some time in the month of July or August following.

I have in my possession an engagement wrote by Mr. Willers, and which I have compared with the letter sent to Mr. Daniel, of Wapping, by him, giving an account of his happy escape from drowning, by means of his Life Preserver; and I have no hesitation in saying, that the letter is in Mr. Willer's hand-writing, so far as comparison will guide me, having seen him *write* and *sign* the engagement above mentioned.

I have the honour to be, &c. &c.

HUGH BROWN.

Mansion House-row, Kennington, March 7, 1808.

To C. TAYLOR, M. D. SEC.

Copy of a Letter from JOHN DICKENSON, *Esq. of the City of Norwich, to Mr.* DANIEL.

SIR,

I INTENDED myself the pleasure of calling on you, and acquainting you personally of a singular incident, when the

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the excellence of your n
conspicuously manifest

I went from the city
I keep for the amuseme
gentleman and two lad
the evening, was indis
wind favouring us both
the distance being onl
sail about four o'clock, i
and fortunately procure
ing hard at south-east)
the interest of a friend
one at Newcastle. Th
after sailing, to have b
ing to enter Norwich
water, two miles over
a sudden gust overset
panion, and two ladie
ever seen at sea, (exce
may judge my situatio
was jokingly filled as
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gentleman, whose nam
ming, and with diffic
him; and then directi
my coat, over which t
towards the ladies, wh
in a state of fainting wh
of the ladies under eac
from the collar of the c
us on shore upon Burgh
been thrown, with what

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anceof some country men directly, (after taking refreshment at a marsh farmer's house, where we procured some dry clothing for the ladies, who were now pretty well recovered,) and by their endeavours put the boat in sailing trim, and prosecuted our voyage to Norwich, which we effected by eleven o'clock that night.

From this singular escape, on my return from Birmingham, I shall be induced to inspect your warehouse, and procure the various prices of your invention, anxious to recommend it in even sailing excursions, in which its utility has been so evidently demonstrated, and its use ascertained.

You are at liberty, Sir, to make whatever use you please of this account, and I beg to subscribe myself,

Sir,

Your most obedient humble Servant,

JOHN DICKENSON.

Swan with Two-Necks, Lad-lane,
Jan. 30, 1807.

SIR,

I HAVE lately received a letter from my friend, Mr. A. French, making enquiry respecting an accident which happened some time since, at the extremity of an extensive piece of water, (called Braydon, near this town), of a pleasure-boat being upset, in which were two ladies and two gentlemen, who were providentially saved by one of Daniel's Life

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Life Preserver's, from the turbulence of an open water, which, when the wind is high, is very violent, and resembles a rough sea. I beg leave, therefore, to acquaint you, Sir, for the information of the Society of Arts, &c. that the above circumstance is within the recollection of myself and many other persons in this place, and also of Norwich, to which city the boat was destined. I feel myself happy in giving this testimony of the excellence of the Life Preserver; and for humanity's sake, I sincerely hope its publicity will be promoted as much as possible, and patronized by every enlightened individual.

I am, Sir,

Your obedient Servant,

W. BARTH.

Great Yarmouth, March 7, 1808.

To C. TAYLOR, M. D. SEC.

Reference to Mr. Daniel's Machine, called a Life Preserver when Shipwrecked, Pl. 10. Fig. 1.

A, represents the body of the machine, which is double throughout, made of pliable water-proof leather, large enough to admit its encircling the body of the wearer, whose head is to pass betwixt the two fixed straps, B B, which rest upon the shoulders; the arms of the wearer pass through the spaces on the outside of the straps; one on each side, admitting the machine under them to encircle the body like a large hollow belt; the strap, C, on the lower part of the machine, is attached to the back of it, and

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by passing betwixt the thighs of the wearer, and buckling at D, holds the machine sufficiently firm to the body, without too much pressure under the arms. The machine being thus fixed, is inflated with air by the wearer blowing in from his lungs through the cock, E, a sufficient quantity of air to fill the machine, which air is retained by turning the stop-cock. The machine, when filled with air, will displace a sufficient quantity of water to prevent four persons from sinking under water.

Mr. Daniel recommends his Life Preservers to be prepared as follows: viz. To select sound German horse-hides, and to cut a piece six feet long, and two feet six inches wide, free from blemish or shell; it is first to be curried, and then rendered water-proof by Mollersteins patent varnish, of Osborn-street, Whitechapel, which preserves the leather more supple, and admits it to be easier inflated than any other water-proof leather.

The leather is nailed on a board, and the varnish applied upon it; it is then to be passed into an oven several times, the varnish being each time repeated, till the leather is completely covered; it is then cut in the form of a jacket, as above described, and neatly and firmly stitched; the seams and stitches are afterwards to be perfectly secured by the following black elastic varnish.

℞.—Gum asphaltum, two pounds; amber, half a pound; gum benzoin, six ounces; linseed-oil, two pounds; spirits of turpentine, eight pounds; and lamp-black, half a pound; united together in an earthern vessel with a gentle heat. The machine, when properly made according to the drawing and description, resembles a broad belt, or circular girdle, composed of two folds of pliable leather attached together, and perfectly impervious to water. When used, the wearer

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wearer introduces
stop-cock in fron
each shoulder, to
lower strap, C, i
buckled in front,
forced back; the
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properly filled, th
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of water so great
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sent Publication, with some further Particulars then omitted.

Models and Drawings of the whole Apparatus are reserved in the Society's Repository, for the Inspection of the Public.

THE several trials made before a Committee of the Society at Woolwich, on the 29th of August 1791, of throwing a line on shore on this principle, were as follow.

From a boat moored about 250 yards from shore, the shell was thrown 150 yards on shore, with the rope attached to it; the shell was of cast-iron, filled with lead, it weighed 75 pounds, its diameter eight inches; the rope in the trial was a deep sea-line, of which 160 yards weighed 18 lbs. the angle of the mortar from whence the shell was fired, was 45 degrees. By means of the line, Mr. Bell and another man worked themselves on shore upon his raft of casks; there were many kinks in the rope, which were with ease cleared by Mr. Bell, in which he was much assisted by his snatch blocks.

The second trial was repeated in a similar manner, and with equal success, the shell falling within a few yards of the former place, the gale of wind was brisk, and the water rough. The direction of the shell was nearly from north to south, and the wind blew nearly north-west.

In the third trial, the mortar was elevated to 70 degrees; the rope attached to the shell, was an inch and half tarred rope, of which every 50 yards weighed fourteen pounds and a half; the shell of the kind above-mentioned, it fell 160 yards from the mortar, and buried itself about two thirds in the ground; the line or rope ran out was about 200 yards, and it required

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quired the force of three men to draw the shell out of the ground at that distance.

The grommet, in all these trials, was of white three inch rope; and in all the above trials, by means of the line, two men worked themselves on shore upon the raft: each charge of powder was fifteen ounces.

A fourth experiment was made by firing, from the same mortar, a grapnel in a wooden case; it did not retain its hold in the ground so well as the shell, but amongst the crevices of rocks, or where the vessel is near shore, will be useful.

A grapnel of this kind may be fired from a common cannon with an endless rope, running in a pulley or small block fixed thereto, by which a raft may be successively drawn to and from the vessel either by the persons on board the vessel, or those on shore.

Observations made by Lieutenant Bell, upon throwing a Line on Shore in Case of a Ship being stranded.

1st, From the proposed construction of the piece of ordnance, intended to throw the shot and line on shore, I suppose it will be between five and six hundred weight.

The chamber is to contain one pound of powder, and the bore to admit a leaden ball of sixty pounds or upwards; the length of range, or distance, will depend upon the size of the line made use of; I suppose it will carry a deep sea-line between three and four hundred yards distance.

2d. All ships that have iron ballast, may use this piece as

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as a part of it, and then there would be only the trifling difference of casting so much of the ballast into the form of the piece; the leaden balls may likewise be used as ballast.

3d. I am of opinion there are various ways, on board of a ship, that the mortar may be placed in a proper position for firing without a carriage expressly made for it; it may be placed upon a coil of rope, or its trunnions rested upon coins, or any thing else, whereby the muzzle can be raised so high that the groove upon the trunnion appears vertical, as the piece in that position would be elevated nearly 45 degrees.

4th. As I imagine all ships carry deep sea-lines, on that account I made use of it in the experiments at Woolwich, but if it should be thought too short for the distance, any other light line may be added to the length of it.

5th. Supposing a ship's owner to purchase such a piece of ordnance with the leaden balls, and a block carriage; I do not think the whole would amount to more than ten or eleven pounds expence.

6th. Where a ship is driving or unmanageable near the shore, it would be proper to have the piece loaded, the line reeled upon hand-spikes or poles, and laid upon the deck ready for firing at any time it might be judged necessary. The hand-spikes or poles, the line is reeled upon, preserve it in an horizontal form; and they are not to be drawn out until the instant of firing: in this manner the line will deliver itself freely.

The five water-casks should also be prepared in readiness, by lashing them together, and a seaman's chest fixed upon the top of them, having part of its ends or sides cut out in order to let out such water as may be thrown into it by the surf. I dare undertake to land with such a float upon a lee

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a lee shore any where upon the coast, when it might be deemed unsafe for a boat to make good its landing.

7th. There is every reason to conclude, that this contrivance would be very useful at all ports of difficult access both at home and abroad, where ships are liable to strike ground before they enter the harbour, as Shields Bar, and other similar situations, when a line might be thrown over the ship, which might probably be the means of saving both lives and property; and moreover, if a ship, was driven on shore near such a place, the apparatus might easily be removed to afford assistance; and the whole performance is so exceedingly simple, that any person once seeing it done, would not want any further instructions.

JOHN BELL.

Woolwich, Aug. 29, 1791.

Some further Observations made by Lieutenant Bell, upon the Application of the Mortars intended for throwing a Line on Shore, in Case of a Ship being stranded.

1st. In trading ships, this piece would answer for making signals of distress, by filling the chamber with powder, and well wadding it, as the report would be heard some miles distance at sea.

2d. Such a gun, being accompanied with a few rounds of round and grape shot, would defend a ship much better than

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than a longer gun, against any piratical or other hostile intentions, as, from its shortness, it would be more readily loaded and fired with a larger charge each time.

3rd. Accidents from a gun bursting, which may arise from an unskilful person loading with too great a proportion of powder, is in this piece effectually guarded against, by the chamber being constructed to contain but one pound of powder, a quantity which is only about one-third of the usual charge of a cannon.

4th. From the small size of such a gun and carriage, it might be kept upon deck, without much inconvenience in working the ship, in order to be ready if necessity required; and when the ship is out at sea, it might then be put below. But from the number of dreadful wrecks, which so frequently happen along the coast, it certainly would be prudent to have it always upon deck when within sight of land, and particularly in stormy weather.

JOHN BELL.

Woolwich, Sept. 20, 1791.

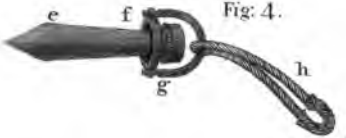
To C. TAYLOR, M. D. SEC.

Reference to the Engraving of Lieutenant Bell's Method of throwing a Rope on Shore, from a stranded Vessel, Pl. 10. Fig. 8.

a, Represents the mortar on its carriage; *b*, the shell shown within the mortar by dotted lines; *c*, the grommet, or double rope, which connects the shell and line; *d d*, the line

Mr. Daniels Life-preserver from Shipwreck.

Fig: 6.



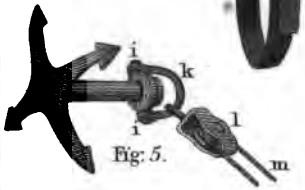
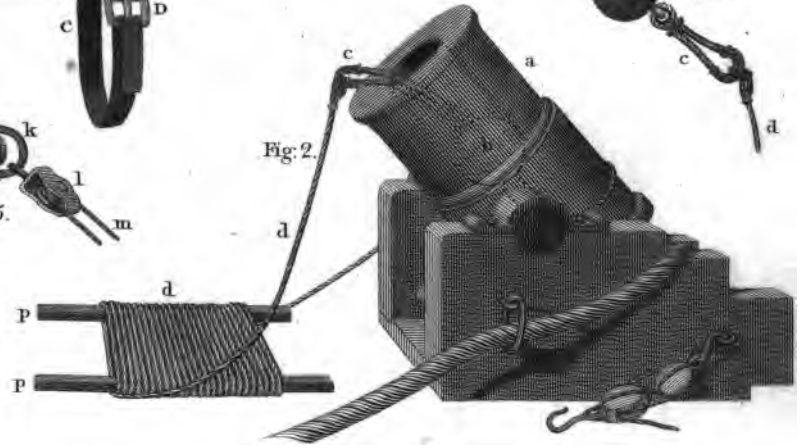


Fig: 7.



Lieut.r Bells Method of saving persons from stranded Ships.

C. Varley del.

S. Porter sculp.

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line to be thrown on shore, now ready wound on the poles or hand-spikes, *p p*, and which are to be withdrawn when the mortar is fired.

Fig. 3. Is a separate view of the shell, with the grommet and end of the line attached thereto, explained by the same letters.

Fig. 4. Shows another invention, suggested instead of a shell, and to be fired from a common cannon, in which *e*, is an iron pin; *f*, an iron collar and rope sliding upon it; *g*, an iron ring which turns upon two pins in the collar; *h*, is the grommet or double rope, attached to the ring, to which the line to be thrown on shore is fastened. This plan may be used where people are on shore, to assist when a line is thrown.

Fig. 5. Shows a grapnel which may also be fired from a common cannon; the collar slides along it in the same manner as that in fig. 4, to allow the head of the pin to go down to the wadding within the cannon; *i i*, are two pins on which the ring *k*, is moveable; *l*, the block or pulley fastened to the ring; *m*, the endless or double line running through it.

This method may be used with great advantage, where a ship is stranded near the shore; but where a mortar is on board, the use of the shell and line is the most certain.

Fig. 6. Shows the method of forming a raft, by lashing together with ropes five empty water-casks belonging to the ship.

Fig. 7. Represents the raft ready for use; the apparatus *n* to hold the person upon it, is made from a seaman's chest with holes cut in the sides of it, to allow the person within it firmer hold, and to let out the water that may be thrown into it from the waves; *o o* are two pulleys attached to the ends of the chest,

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chest, and through which the line is to run; the raft is to be ballasted underneath, to prevent it from upsetting.

The whole apparatus is so arranged as to be inclosed in a small box, as may be seen by a reference to that in the Society's possession.

PAPERS

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PAPERS

IN

COLONIES AND TRADE.

The Sum of TWENTY GUINEAS *was voted in December 1807, to Mr.* EZEKIEL CLEALL, *of West Coker, near Yeovil, in Somersetshire, for his Machine for beating out Hemp-seeds and Flax-seeds, likely to be useful in Canada.*

The following Communication was received from him, an explanatory Engraving is annexed, and a Model of this Invention is placed in the Society's Repository.

SIR,

I MADE a model of a machine for thrashing out hemp-seed and flax-seed, in the year 1803; and in the year 1805, I had a real machine made after the plan of the model, by Mr. John Wadman, carpenter and hemp-merchant. The said machine has been since tried and approved by many hemp and flax-merchants.

I now send the model for the inspection of the Society, and leave the event thereof to their decision. It does not injure the stalk of the hemp so much as the common mode of thrashing out the seed, and consequently leaves it much better for scaling.

I am, Sir, your humble Servant,

EZEKIEL CLEALL.

West Coker, near Yeovil, Somerset.
March 22, 1806.

SIR,

In compliance with your request, I have sent certificates of the success of my machine in practice for thrashing out hemp-seed and flax-seed, which being signed by people of respectability who have used it, I hope will prove satisfactory.

I am, Sir,

Your humble Servant,

EZEKIEL CLEALL.

We whose names are hereunto subscribed, do certify, that we well know Mr. Ezekiel Cleall, of West Coker; that we have many times seen his machine at work, in thrashing out hemp-seed and flax-seed, and think it likely to be of great public utility; inasmuch as two women, whose wages and allowance never exceeds one half of what are allowed to two men, will do as much work in any given time as such two men.

That the seeds thrashed by this machine are not so much bruised or injured as by the old or common way, and the hemp and flax are preserved from many injuries which they suffer from the old method.

In witness whereof, we have hereunto added our signatures.

John Wadman.
James Wadman.
John Baker.
John Pinney.
John Chaffey.

West Coker, Feb. 1807.

To C. Taylor, M. D. Sec.

SIR,

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placed; B the axis in which the four arms, C C C C, are fixed; D D D D, eight single flails, moving upon four pins near the extremities of the four arms; these flails diverge from the pins on which they move, so that two of them united on each arm are nearly in the form of the letter V. E is the winch or handle by which the machine is put in motion; F F, two upright pieces of wood to sustain the axle of the machine; G, an upper cross-piece, to secure the uprights firm; H H, the two bottom pieces or sills, in which the two uprights are mortised, also the two smaller uprights which support the board or table A; I I, two lower cross-pieces to secure the machine firmly; K K, two levers on which the table A rests, and by which it may be raised or lowered as thought necessary by iron pins, at K K, passing through these levers and the two uprights.

When the machine is used, the hemp must be laid on the table A, and moved about in different directions by the person who holds it, whilst another person turns the machine by the handle E; the flails D of the machine fall in succession on the hemp; as the axis moves round they beat out the seeds as different surfaces of the hemp are exposed on the table, and when the seeds are all beaten out from one parcel of hemp, a fresh quantity is applied upon the table.

Fig. 2. Represents one of the flax-beaters, which is made of a solid piece of wood, one of which is attached instead of the two flails, to every arm, when the machine is employed for beating out flax seeds, as they require more force to separate them from the flax plant.

The

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The SILVER MEDAL *of the Society was this Session voted to* WILLIAM BOND, *Esq. of Canada, for his Observations on the Culture of Hemp, and other useful Informations, relative to Improvements in Canada.*

The following Communication was received from him, and an explanatory Engraving of his Machine for breaking Hemp is hereunto annexed, and a Model of the Machine is preserved in the Society's Repository.

Observations on the Culture of Hemp, the Breeding of Rabbits, Guanaco, &c.

HEMP.

THE culture of hemp in Upper Canada is no doubt one of the most desirable objects with every person of discernment settled there, and more particularly so with those of this description in our mother country; and though there are so many millions of acres so well calculated to the growth of this highly valuable article, yet I do not expect much progress therein for some time, for the following reasons.

The part of the country the best calculated for the growth of hemp is so lately and in so small a degree occupied, that few have begun to use the plough, but depend upon raising a sufficiency of grain by harrowing only; in this they are not disappointed for two or three crops;—in the mean time they clear away fresh fields from the woods, many of them to a large extent, which take up so much time in fencing and dressing, that few of the farmers have been able to raise more than needful for their own families' consumption, and for the use of their neighbours;

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bours; indeed they are ignorant as to the growth and management of hemp, and in general so poor, that they cannot afford to raise any thing for sale that will not bring them ready money as soon as brought to market; and grain brings such a high price in cash, that few farmers are inclined to turn their attention to any other article. Another obstacle is, there being no person or persons appointed to buy small quantities of hemp, and pay ready money for the same.

The tract of rich hemp land in Upper Canada is that part west of Yonge Street, * and north of Dundas Street,† and partly inclosed by lakes Ontario, St. Clair, Huron and Simcoe, and to the east and north east almost as far as Grand or Ottaway River, and to within a few miles of the south and south east side of Lake Huron. I have not failed to make annually from one to three journeys through this tract; I have crossed it in all directions with Indian guides, great part of which no white man, except myself, has ever set foot in; and I find, that chief of the interior part consists of a rich deep black soil, which I am well convinced, when well inhabited with farmers, will become one of the finest countries in all his Majesty's territories for the growth of hemp.

It is only about five years since this valuable tract began to be occupied at all, and though by industrious farmers, yet by such as have brought little to the country. A few cows and sheep, a *pair* of plough-oxen, one or two horses, a small stock of farming tools, such as two or three axes, as many hoes and iron wedges, one or two ox-chains,

* A street leading from York, the seat of government, to the navigable waters of Lake Simcoe.

+ Leading to the River Thames.

being

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being the most that a new settler (generally speaking) possesses on his arrival; with these they make a shift to clear away the woods, and divide and fence the land with split timber into fields, and they are greatly encouraged to continue clearing away the forest, in consequence of the high price given for the ashes by the pot-ash makers: this eventually will be vastly in their favour, in future, when hemp becomes the object, as it gives time for the roots and stumps of trees to rot, their stock of horses and oxen to increase, which is essentially necessary before the farmer can expect to be successful in the growth of hemp. It is in this progressive manner that this fine country will be settled; the nature of things demands the pursuit; and the first settlers are in a situation capable of putting the same in practice; their stock of horses and oxen are sufficiently strong to work the ground a second time over, tear up the stumps and roots, plough and pulverize the soil; and until the ground is brought to this state, it is not fit for hemp, as hemp, in its nature, depends chiefly upon a tap root, and when this root is interrupted in its progress downwards, it will throw out horizontal ones, which produce horizontal branches also, and the open spaces round the stumps of the trees admitting so much air, permits these branches to grow to such a length and strength as greatly to injure the bark or hemp of the stem. Such hemp, when it comes to the hackle, breaks off, and drags away at the knobs of the branches, so as to leave it short, and make a very great waste; notwithstanding, if there was a sure market for as small a quantity as 50lb. there are few farmers but would try the experiment; and if one was more successful than the rest, his neighbour would endeavour to find out the reasons why it was so; thus, step by step, the knowledge in the manage-

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ment of hemp would be greatly extended, the farmer would generally be in possession of fresh seed, and when grain becomes less an object, he would feel no fear in turning his attention to the culture of hemp upon a large scale; and, in order to encourage the farmer, it would prove highly advantageous to take in any quantity, great or small, of sound hemp, assorted perhaps into four or five qualities, according to its length, which will vary for some years to come, for the reasons before given.

The high price of labour, owing in some measure to the high price of grain, is such, that hemp, agreeable to the present regulations, is not an object with the farmer; if an addition of about a third of the present price was given, it would be an inducement for the farmers to cultivate their old fields in a more spirited manner, which bounty might be taken off again, when grain becomes less an object than it is at present, which will soon be the case in time of peace, and no doubt will affect the price of hemp in proportion in the English market.

In all new countries where labourers are scarce, we find many contrivances calculated for the purpose of reducing labour, more for the sake of expedition than ease; such, for instance, as the saw-mill, the hoe-ploughs, scythe and cradle for cutting and gathering grain, the wooden machine drawn (round by one horse) for thrashing grain, the iron shod shovel, drawn by oxen, and held by two handles, as a plough, for the purpose of levelling the the roads, &c. &c. Nor are the Americans, or other settlers &c. in this country, fond of any work that needs violent exercise of the body, which the breaking of hemp in the old way certainly occasions, in consequence of requiring a cross motion of each arm, which makes the breakers complain of a pain about the short ribs on the side they hold the hemp; and

and on the opposite side a little under the shoulders, so that breaking of hemp in the old way is a great obstacle to its increased culture. To render labour, therefore, somewhat more easy and expeditious, is an object worthy the first attention, and I consider it practicable at a small expence, and have sent to the Society a model of a machine for this purpose.

I have observed among the clothiers' and fullers' machinery, great power and rapid motion proceeding from what is commonly called a dash wheel, erected across a stream of rapid water, the flies or float boards of which are fixed in the octangular axis, from fifteen to twenty-five feet in length, and from three and a half in depth, each flie. I have seen many corn mills in Upper Canada, with no other water-wheels than such as the above described, which save a vast expence in raising dams, &c.

There are a number of streams in that part of Canada, which I have endeavoured to describe, (as to the practicability of the various ways of cultivation) that are well calculated for such wheels; and where these streams or rivers are not too wide, the axis of the wheel might be extended across so as to reach the land on each side, where I prepare the breakers to be fixed to go by a tilt the same as a forge-hammer, and such a simple piece of machinery would not cost more than 70 or 80 dollars, as little iron would be wanted, and timber we have for nothing; and when in motion would employ four breakers and two servers, from whom I should expect as much good work as fifteen or sixteen persons could possibly do in the old way, and that without much bodily labour.

Mills for breaking hemp, on the very same principle as that of a saw-mill, as to motion only an addition of an iron

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crank, so as to run with two cranks instead of one, with something of a larger sweep than that of a saw-mill, would be of vast utility in a neighbourhood of a large growth of hemp, and would not cost more than a common saw-mill, as the brakes of the frame continue in motion the same as that of a saw-mill, twenty men might be employed, who would do as much as fifty or sixty could do in the old way, and with much more ease and pleasure to themselves; and this is not the only advantage that would result from such mills; it would cause something of a social meeting, which the youth would be particularly fond of. At such meetings all the defects respecting the culture and management of hemp would be examined into, and those who raised the best would become ambitious, and try to excel each other; thus we might reasonably expect that Upper Canada would far exceed all other countries in the world for the growth of good hemp.

Reference to the Engraving of Mr. Bond's Machine for breaking Hemp. Pl. 11, *Fig.* 3, 4.

Fig. 3. *a*. Represents the axis of a water-wheel, on which is fixed a trunnion of four lifters *b b b b*, each of which lifters raise in succession a lever *c*, which, by means of a chain connected with it pulls down another lever *d*, and thereby raises the upper part of the double brake *e*; as each lifter of the trunnion passes the lever *c*, it allows the upper part of the brake to fall upon the hemp placed on the lower part of the brake *f f*, and by its weight and teeth intersecting the teeth of the lower brake *f f*, the woody parts of the hemp plant are separated by repeated strokes from the filaments

or

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or fibres of the hemp proper for use, and completes the first operation necessary in the preparation of hemp; *g* is a table on which the woody parts of the hemp fall, and which table gives security and strength to the frame; *h h h h* are the four legs or supports of the frame.

Fig. 4. Shews a section of the teeth of one half of the double brake abovementioned: it is betwixt the upper and lower rows of these teeth that the breaking of the hemp takes place, by the repeated rise and fall of the upper part of the brake upon it.

Fig. 5. Shews the upper part of the brake, in which *i i* shew the two rows of teeth, *k k* the two pins on which it is moved, *l l* the part to which the chain which raises the upper part of the brake is attached. After the breaking of the hemp, it is wholly finished for use by scutching or swingling, an operation which may be either performed by the hand or machinery, and is easily executed by either mode.

The machinery for breaking hemp should be removed from the rivers previous to the beginning of the frosts.

THE WARREN RABBIT.

To include the interest of the colonists and the mother country also in one and the same pursuit, is not only laudable, but most likely to succeed, especially where only a trifle of property of the individuals or of the public is wanted to set the bountiful hand of Nature to work in a country where animal subsistence, and a suitable climate calls for the industrious husbandman, who may in various ways be useful to himself and his country.

In

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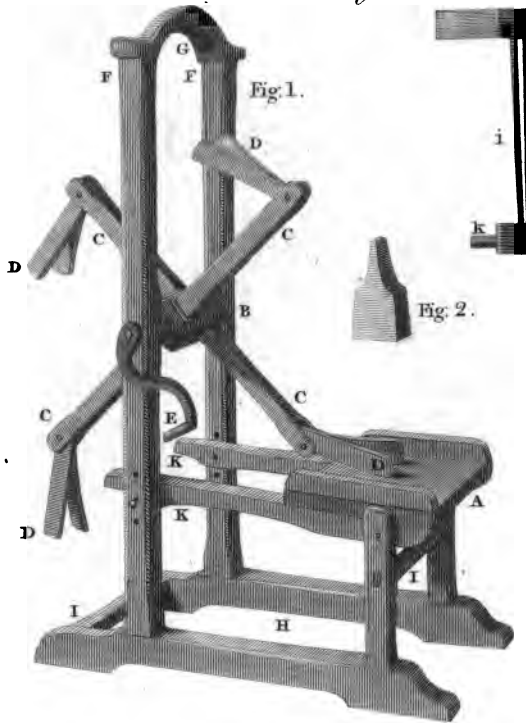
In my travels through America, I have often been surprised that no attempt has been made to introduce, for the purpose of propagation, that useful little animal, the warren rabbit, of such vast importance to the hat manufactory of England. It is chiefly owing to the fur of this animal that the English hats are so much esteemed abroad. It is a fact well known amongst the hatters, that a hat composed of one half of coney wool, one sixth old coat beaver, one sixth pelt beaver, and one sixth Vigonia wool, will wear far preferable to one made of all beaver, as it will keep its shape better, feel more firm, and wear bright and black much longer.

The value of the coney wool, the produce of the united kingdom only, is not less, I will venture to say, than 250,000*l.* per annum; but the quantity is much diminished, owing to the banishment and persecution they meet with on every side, and so many small warrens taken in for grain land; in consequence of which it is time, that some protection should be afforded, if possible, to that important branch of British manufactory (in which coney wool is used) from suffering any inconvenience in the want of so essential an article, and the accomplishment of this grand object I conceive perfectly easy.

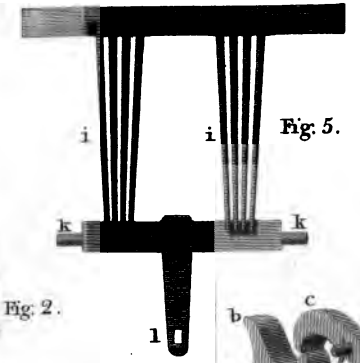
General Observations.—When I speak of the warren rabbit, I have to observe, that there are in England, as well as in most parts of Europe, three other kinds, viz. the tame rabbit, of various colours, the fur of which is of little value, except the white; the shock rabbit, which has a long shaggy fur of little value; the bush rabbit, like those of America, which commonly sits as a hare, and the fur of each is of a rotten inferior quality.

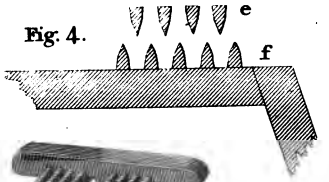
To return to the warren rabbit.—There are two sorts in respect

Mr. Cealls Machine for thrashing Hemp.



Mr. Bonds Machine for breaking Hemp.





S. Porter sculp.

L. Farley del.

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respect to colour, that is, the common grey, and the silver grey, but little or no difference in respect to the strength and felting qualities of the fur. The nature of this animal is to burrow deep in sandy ground, and there live in families, nor will they suffer one from a neighbouring family to come amongst them without a severe contest, in which the intruders are generally glad to retire with the loss of part of their coats, unless when pursued by an enemy, when they find protection.

It is scarcely worth while for me to mention a thing so generally known, viz. that rabbits, particularly those of the warren, are the most prolific of all other four-footed animals in the world, nor do I apprehend any difficulty would attend the exporting this little quadruped with safety to any distance, provided it was kept dry, and regularly supplied with clean, sweet food, and a due regard to the cleanliness of the boxes or places of confinement.

Twelve or fifteen pair of these valuable animals taken to Upper Canada, and there inclosed within a small space of ground suitable to their nature, but furnished with a few artificial burrows at the first, by way of a nursery, spread over those now useless plains, islands, and peninsulas, so well calculated to their nature, would, I will make bold to say, the eighth year after their introduction, furnish the British market with a valuable raw material, amounting to a large sum, increasing every year with astonishing rapidity, so as to become, in a few years, one amongst the first of national objects.

It may be supposed by some, that the above project is magnified beyond possibility, or even probability, but from the serious attention I have paid to the subject, these many years past, as to all points for and against, leaves no room to

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to accuse myself of being too sanguine, for if properly managed a few years at the first, I cannot find a single thing likely to interrupt their progress.

Some idea of the astonishing increase of the rabbit may be had from the following facts:—

An old doe rabbit will bring forth young nine times in one year, and from 4 to 10 each time; but to allow for casualties, state the number at 5 each litter.

In nine months	45
The females of the first litter will bring forth five times the proportion, of which is 2½ female's produce	62
Those of the second litter 4 times produce . .	50
Ditto of ditto third ditto 3 ditto ditto . . .	37
Ditto of ditto second ditto 2 ditto ditto . . .	25
Total in one year from one pair	219

The third female race of the old dam and the second of the first litter, seldom breed the first year, but are early breeders in the spring following, when we might expect an increase of the whole in proportion to the first pair, if properly attended to and protected.

It is generally allowed, that hares are not more than one fourth as prolific as rabbits, notwitstanding, agreeable to an experiment tried by Lord Ribblesdale, who inclosed a pair of hares for one year, the offspring was (as I have been credibly informed) 68: these animals, could they be exported to Upper Canada with safety, and there protected within inclosures for a few years, would soon after spread over a large extent of country: the fur is nearly as valuable as that of the rabbit.

In

In that part of Upper Canada within the 45 degrees of north latitude, and the southern and western boundaries, the climate is nearly the same as that of England, a little hotter a few days in summer, and a little colder a few days in winter, agreeable to Farenheit's thermometer, which I have paid great attention to for some years, comparing the same with the observations of the English.

The increase of most animals appears much greater in proportion in America than in England, mankind not excepted: that of sheep is very apparent to those that pay attention to their breeding stock, which gives me hopes, that in a few years we shall be able to pay for our woollen cloths in wool. Finding the effect of soil and climate so salutary to sheep, &c. it may be reasonably supposed, that rabbits will answer the most sanguine expectations, as I understand the wool of the sheep retains all its nature the same as in England, particularly its strength, and felting qualities among the hatters, which assures me that rabbits wool from those bred in Upper Canada will do the same; and there are some million of acres within the latitude and boundaries which I have before described, suited to the nature of the warren rabbit; nor do I apprehend that the wolves, foxes, &c. of Upper Canada will be half so destructive as the poachers in England.

The Guanaco,

or camel-sheep of South America, no doubt will be a national object at some future period. This is a tame, domestic animal, very hardy, and used with much cruelty by the natives in travelling over the mountains with their burthens; it shears a fleece of wool of from 2lb. to 3lb. which

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a few weeks, a few specimens of Irish herrings, of a large size, cured after the Dutch method.

Ministry have now taken up the business of the fisheries seriously; and it is therefore to be hoped, the introduction of the deep sea fishery will be fully considered of. Dr. Jeffray made an application lately to the Privy Council, for one or two of the Dutch prize fishery vessels at Yarmouth, and which application is still pending. If they could be procured on liberal terms, I would engage to fit them out next season; and if such experiments are to be encouraged, measures should be immediately taken to prevail on part of the Dutch fishermen now prisoners in this country, to assist. It was, in a great measure, by the Dutch fishermen who were procured last war, that the curing has become so much an object of attention since.

I am, respectfully, Sir,

Your obedient Servant,

WALTER BAINE.

Greenock, Jan. 12, 1805.

To C. TAYLOR, M. D. SEC.

SIR,

AGREEABLY to my last communication, I have forwarded to you specimens of the Irish herrings I then expected. They are cured as near to the Dutch method as, from the knowledge I have of it, is in my power; to form a proper judgment of their cure, it is necessary that they contain the brine, and care ought to be taken in opening them not to lose it. It is also necessary to observe, that in judging

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the vexatious excise regulations and restraints to which they will be subjective. The revenue boards will now consider the persons engaged in the fisheries as objects of their jealousy, and the least irregularity will be made a handle for grievous prosecutions. But notwithstanding the pernicious effects these duties will have on the fisheries, the object of imposing them will not be accomplished in the manner government expects, as far as relates to Scotland. Smuggling will be carried on to a greater extent, and there will be less revenue on the article in Scotland than formerly, from the great temptation and advantage it will afford to smugglers. The first cost of common fishery salt is now fourpence halfpenny per bushel at the works at Northwich; it stands on board at Liverpool about sixpence per bushel, the duty on which is fifteen shillings. In the Isle of Man, salt is duty free for every purpose. To smuggle it from thence the person only runs the risk of losing it; but if he save only one tenth of the quantity, it may be made a trade. In corroboration of what is stated, as to the effects of the salt duties on the fisheries, the Board of Excise instituted prosecutions last year, which, if they had accomplished their object, would have ruined the first adventurers here and in Leith; though the Board admitted they had no information of fraud, or could make out such charge against them; and the Board would in a great measure have accomplished their aim but for the interference of the Treasury, procured with great exertion.

I am, with respect, Sir,

Your most obedient Servant,

WALTER BAINE.

Greenock, March 15, 1805.

To C. TAYLOR, M. D. SEC.

SIR,

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SIR,

I AM still prosecuting the business which is the subject of our correspondence, and have acquired considerable additional knowledge in it since last season. I can now procure brine in taste, flavour, colour, and consistency, equal to any Dutch brine: this has been hitherto the great desideratum in our cure.

Our plans of curing this season are much more complete and extensive than formerly, the herrings are of a much better size and quality, and the prospects of fishing more flattering. I am of opinion the herrings forwarded you last season would not give the satisfaction I could wish, as the herrings were poor of themselves, and the method in which the greater part of them were cured, and in which the astringent principle was employed, I find will not do, and have given it up entirely. If you choose, I will send you some specimens of the herrings I have lately cured, and which I think you will approve of. I am anxious to see the publication you noticed to me of the Dutch placart respecting their herring fisheries; and beg, as a particular favour, that you will procure it for me.

I am, respectfully, dear Sir,

Your obedient servant,

WALTER BAINE.

Gremoch, Aug. 31, 1805.

N.B. The Society, on examination of Mr. BAINE's herrings, found them much superior to the white herrings usually procured from the British fisheries, and equal to

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the Swedish, but rather inferior to the Dutch. The casks were opened at different times; and in some of the barrels kept and examined by the Society three years after the fish were caught, and salted, the herrings were yet in good condition.

The following Publication having been lately under the Consideration of the LORDS *of* HIS MAJESTY'S PRIVY COUNCIL *for* TRADE *and* PLANTATIONS, *and being the Account particularly requested by Mr.* WALTER BAINE, *is annexed with a View to explain the Method in which the Dutch Herring Fisheries have been conducted, and to convey some useful Hints for Improvement of the British Herring Fisheries.*

A TRANSLATION *of the* DUTCH PLACART *and* ORDINANCE, *for the* GOVERNMENT *of the* GREAT FISHERY.

The PLACART *and* ORDINANCE *concerning the Catching, Salting, Landing, Curing, Packing, Heightening, and Laying of the Herrings, &c.*

The States of HOLLAND and WEST-FRIZELAND to all to whom these Presents shall come, greeting.

SINCE, by the obsoleteness of the laws, the orders formerly given for taking and loading of herrings are not duly maintained, as some people, for their particular profit, catch

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catch them before the due season, and salt, send them to market, and sell them, before they are of a proper growth, and fit for the market: and forasmuch as some people, the better to cover their misdemeanors, send them directly to the eastern markets, from sea, and transport them inland, without their being first reported at the customary places, where daily attendance is for that purpose given, which not only causes in these, but in other countries, great disgust to the commodity, and dishonour to the dealers therein, the fish not being then in their full relish and perfection, which occasions those which are good to be suspected and unsold.

And whereas those so caught are neither well salted, sorted, nor properly laid in the barrels, to the great loss, damage, and prejudice of the merchant, the ruin of the herring trade, and of the general consumption.

And whereas this great fishery is the principal mine, and chief support of these countries, and of the inhabitants therein; therefore, and in order to remedy the growing evil, we, with the deputies of the cities, &c. concerned in the herring commerce, do make and establish the following orders.

In the first place, no person shall wet their nets in the sea, or begin fishing before the feast of St. John the Baptist, being Midsummer-day, N. S. or continue fishing from thence, longer than until the 31st of December following inclusive, under the penalty of 200 guilders *, and loss of the herrings taken, or value of the same; and that the several vessels so fishing, in conformity to this ordi-

* A Guilder is 1s. 9d. 86 Stg.

nance, is to be certified to us on the oath of the masters, and of two of their respective crews.

2. Excepting always from this prohibition, such vessels as go upon the Dogger-Bank to fish for cod; those may sail before Midsummer-day, and may catch herrings, provided they take no more than may serve for the crew's present spending; but they shall not, before the said 24th of June, salt them in pots, jars, or barrels, or bring on shore any uncured, or unsalted, nor sell any at sea or on the land, make presents of, or otherwise distribute or dispose of them. And the masters of such fishing vessels, so designing for the Dogger-Bank, are, before they sail, to appear before the magistrate of the city or place from whence they sail; and on their solemn oath declare, that they will not cure, salt, pot, or barrel, or otherwise preserve herrings, or connive at any of their crews so doing, until after the 25th day of June, the day next after the feast of St. John, or Midsummer-day, nor will bring them into port, sell, distribute, dispose, or make presents of them, in any manner whatsoever.

And such master, on his return, shall declare to the magistrate by solemn affidavit, that he has not broke, but kept holy and conscientiously the oath taken by him on his outset, under the penalty of 600 guilders, to be made good by the ship and cargo, any time within one year and a day; and the owners may have their redress over against the master, who shall likewise suffer corporal punishment, according to the greatness of his crime. The fine to be divided; one third to the proper officer, one third to the poor, and the other third to the informer; and the herrings to be forfeited, unless taken

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taken aboard the vessels by the captain of the great fishery, who shall cause them to be thrown into the sea.

3. No ship or boat shall sail out to catch herrings from Holland or West-Frizeland to the north, nor go into deep water, without the master's having first taken out an act of consent, who, on the procuring such an act, shall make oath, that they will not sell or make present of such herrings at sea, nor salt nor cure them on shore, or aboard, under penalty of confiscation of the fish, and of the sum of 25 guilders each barrel. And that the herrings caught of the one night shall be separated from those caught in another, and shall declare which are of each night distinctly, on forfeiture of the vessel and cargo, and degradation of the master.

On the second outset, the vessels shall not put to sea before the 14th of September, nor fish before the 20th of the same month, at which time the masters may put their herrings aboard other ships, and assist one another in the hauling in of their nets.

In case any shall surreptitiously procure an ordinary act of consent, such shall be liable to all the penalties above recited.

4. None shall sell or truck for herrings, but to those who are authorised by the proper magistrate, nor but where the herring trade is established; and the master and two or three of the mariners shall inspect the printed ticket, hereafter specified, in order on their return to make their report, pursuant to the contents of the sixth article. And in case any body shall, when at sea, put herrings on board other ships than as above directed, the master shall forfeit the said herrings, or their value; and beside pay a fine of 600 guilders, to be levied upon the ship or goods, and the owners

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to have their remedy over against the master, who shall likewise lose his office, and be declared incapable of future service.

5. All such as are inclined to follow the busses in vent jaggers to take off their fish, shall first procure of the port-magistrate, where they sail from, an act of consent to follow that traffic, until the 15th of July, of the first fishery, and no longer; provided likewise that they take out from the proper office a ticket, with herring-buss printed at the top, with the date of the year, sealed with the seal of the great fishery, and signed by the city secretary. Provided they promise at the same time upon oath, not to take on board any pickled herring, but from busses of Holland and West-Frizeland; and shall bring with them into port, certificates from the respective masters from whom they purchase fish, signed likewise by two or three mariners of each vessel, with the name of the port they sailed from, the ship's name, the quantity delivered, that they were caught after Midsummer-day, and salted, cured, and laid in barrels in his ship, on forfeiture of the herrings, or the value of them.

If any should, without being supplied with an act of consent, take on board herrings, which they may do, if caught after Midsummer-day, but they shall declare the same on their oath, and on the oaths of two or three of the mariners, that such herrings were caught after Midsummer-day, under the penalty above said.

And all masters are hereby interdicted from putting any herrings on board the vent jaggers after the 15th day of July, under the penalty above, and also of the money received for such herrings, at the risk of the purchaser, and the owners to be totally acquitted.

6. Neither the vent jaggers, nor busses, shall carry the fish

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fish they purchase or take any where but to Holland or West-Frizeland, where the barrels, after visitation, are to be marked or stamped with a hot iron, on forfeiture of the herrings, or their value, and under the penalty of 200 guilders.

Before the master, at the completing of his voyage, shall break bulk, he shall, with two or more of his crew, declare upon oath, in the form hereafter specified, what herrings they have sold at sea, and to whom delivered; whether they had an act of consent to pursue the trade; how much fish were landed at each adventure; that they were caught after Midsummer-day; and cured, salted, and barrelled within their ships, only carried into Holland, or West-Frizeland; also duly reported there; and that before Midsummer-day they neither wetted their nets, nor put any fishing-tackle into the sea. Those who refuse the reporting, not only the last, but former voyages, shall forfeit the unreported herrings, or the value thereof. Every such oath shall be registered in due form, and the officers and committee of the great fishery may, on application, have authentic copies delivered to them.

7. No inhabitant of Holland or West Frizeland shall engage in any share, or part of vessels, set out as fishing busses, or vent jaggers, the property of persons inhabiting out of the said provinces, under the penalty of 600 guilders, and the confiscation of ship and cargo. The information to be deemed good, though made twenty years after the fact committed.

8. The captains of the men of war attending this fishery, are hereby authorized, that in case any master of a buss should, without an act of consent, sell any herrings to the Zealanders, or to any inhabitants of the United Provinces, not of Holland, or Frizeland, or to any foreigners; or who shall

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shall sail from the fishing-grounds directly eastwards. As such facts shall come to their knowledge, they are hereby empowered to arrest such offenders and send them in prisoners.

9. The first caught herrings shall not be sold until they have lain ten days in pickle; and to ascertain the same, the cure-masters and overseers shall mark the cask with a circle round it, between the neck hoop and belly hoop, or in default thereof forfeit 300 guilders for each barrel, one half to the informer, the other to the proper officer; and such who cannot pay the fine, shall be confined to bread and water for a month; and all herrings which come into the provinces, without such circular mark, for consumption, shall be thrown into the sea.

10. Each buss-master shall have his particular mark on such barrels as he intends to land, or that he puts on board other vessels, which mark shall be put on the bung-stave, or the next to it; and he omitting such mark, shall forfeit six stivers * each barrel.

11. Every buss-master is to declare, at the secretary's town clerk office of the port wherefrom he sails, where they intend to fish, what port return to, and what mark they use, in order that the sums may be duly registered, under the penalty of 120 grote †.

12. Each buss-master shall take care, that in packing the herrings be laid close and even; and that whoever is guilty of any fraud, by pressing them with baskets or trays, shall be fined 25 guilders, suffer arbitrary correction, and be obliged to make good the damage to the merchant who may suffer by them. And that the buss-master may not be injured by the roguery of the layer, the said layer shall put his

* A Stiver is 1*d.* 0.9 Stg.

† A Grote is 0*d.* 54 Stg.

mark

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mark a hand breadth within the barrel, as also on the outside on the uppermost part; and on neglect thereof shall suffer arbitrary correction, provided the same is not purposely neglected by the direction of the buss-master.

13. No one shall lay the herrings cross-ways, or falsify, or change them, put the old under new, lay those bit by sharks, or that are sickly, by the good, nor those which are caught of the one night, by those of another taking; nor shall any which are not salted the same evening they are caught, be afterwards cured, under the penalty of 25 guilders each barrel, and naval discipline.

14. Each buss-master shall diligently attend to the sorting of the fish, by separating the full from the poor ones, and not mixing the sound with the night-refuse, roe-sick, milt-sick, stinking or unsightly herrings; nor to put either of those with the other, in the same barrel, but to lay all the distinct sorts in separate casks, and mark them accordingly.

15. Each fisher shall be obliged to declare for what price he will sell his different assortments, distinctly; and if they should happen to fall short of the contract, the cure-master is to take an exact register of them, and to decide the difference.

The buss-master is not only to mark and distinguish the full sound from the weak, but the great from the small, and also those of the like kind, caught in different seasons, from each other; and is with two or three of his crew, to declare in the register's office on oath, that all his cargo is properly and distinctly marked, and was so before the casks were severally stowed in the ship's hold.

16. The buss-master, according as he finds the seasons, may salt the herrings at his own discretion, and cause the net to be laid as he finds the shoals to run.

Of

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Of Curing, Packing, Repacking, &c. of the Herrings.

17. That from henceforth the curing of the herrings shall be perfected within three weeks after coming into port, or after they are sold to the merchant, and shall be repacked once or more, according to the custom of the place, and nature of the herrings; but if the curing is not perfected within three weeks, the buyer shall not pretend to any abatement.

18. The buss-master and book-keeper are expressly interdicted from concerning themselves in the sale of the herrings by taste at the bung-hole; they are only to dispose of them by pack and keur, *i. e.* by wholesale as they arrive, on penalty of paying 50 guilders per last, and confiscation of the fish; one third to the informer, one third for the officer who executes the process, and one third to the poor.

19. No herrings shall be datumen, *i. e.* given gratis. If so found, they shall be confiscated, one third to the informer, one third to the officer in execution, and one third to the poor; and the person who so cured them shall lose his office.

20. No herrings shall be heightened with fresh pickle, nor repacked but in the public street, on the keys, or in such places as are customary, with open doors, where any body may go in or out; and whoever packs, &c. with the doors shut, or hinders any body coming in, shall forfeit 240 grote to the proper officer, as often as found guilty.

21. The cure-masters are to take special care, that no nasty, wrack, unsightly, roe-sick, milt-sick, or other indisposed herrings, shall be used to fill up or heighten the barrel; but each, in their different order, to be filled with herrings of the like kind, in the penalty of 120 grote each barrel,

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barrel, whereto the merchant, packer, filler, and every one in particular concerned in packing are alike liable. And that this may be more commodiously effected, it is ordered for the future, that no herrings shall be packed or heightened to be sent beyond sea, before that the cure-masters do inspect and ascertain, that the herrings are packed in due order as abovesaid. And further, to prevent fraud, the place-master where the herrings are packed, &c. shall set his mark on the cask, between the third hoop and the neck hoop.

It is likewise expressly forbid to pack small sweet-wrack herrings with the great, but each shall be heightened by those of the like nature and season of taking; and according to the different sorts and takings, the casks are to be branded with such different marks upon the belly, as is by this ordinance specially directed, as also the city mark.

22. The coopers are in packing to dispatch the bad and unfitting barrels first, for present expending; but for the keeping herrings, they are to take good barrels, to the liking of the merchant, or of the cure-masters, who are to see it done, and, in default, the herrings are to be taken out and repacked without any expense to the merchant, and the offender to pay four grote Flemish each barrel.

23. The coopers shall not hoop branded or other repacked casks with half barrel or green hoops, but with good whole barrel hoops, made the March preceding.

24. No barrels which are to be sent abroad, shall have less than fourteen hoops.

And whereas, it has been discovered to have been heretofore a practice, to pack the several sorts of herrings in unlawful barrels, to the great detriment of this profitable commerce, it is therefore forbid, for any body hereafter to pack herrings in salmon casks, or other unfit vessels, but solely

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solely and simply in barrels made and burnt conformable to the ordinance published, concerning the making, curing, and burning of the barrels, on penalty of confiscation of the herrings, and for each stave, small or large, 20 guilders for the informer, officer, and poor.

25. Also that any servants of the packers, coopers, or other officer, who may pack in salmon or other unlawful cask, shall immediately be discharged their places.

26. We also forbid to pack in any barrel, salt, spice, or or other commodity, under cover of brand, wrack, or other kind of herrings, to be sent westwards, under pain of losing the said barrels, and all which is therein contained, besides to pay 100 guilders, and to suffer corporal correction; as also to make good the damage which the merchant or skipper may suffer thereby; and the porters or servants employed therein, shall suffer as in the foregoing article.

27. The herrings caught after St. James's-day, and salted with fine salt, may be exported for wrack westward, as has been formerly accustomed; the barrel to be bound with sixteen hoops, the date of the year upon the belly thereof, without letters or cyphers, and the mark of the purchaser thereon.

Of Salt.

28. No Spanish or Portugal salt shall be stowed into chests or barrels, before the cure-master has examined and found it good, under the penalty of 25 guilders for every hundred weight.

29. No buss-master shall carry to sea, for the use of the herring fishery, any other but Spanish or Portugal salt, twice examined by the cure-master, who shall open

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Brabrant, and so on westward, any barrels of herrings otherwise marked than with the grand Rouen brand, and fished and packed after Bartholomew tide.

Nor shall any herrings be exported to Bremen, Hamburgh, Cologn, or other places that way, cured with coarse salt, whether full or slender fish, wrack or refusal, under penalty of forfeiting the herrings, or value of the same, and a fine of 6 guilders each barrel, and naval correction.

36. Packers, coopers, and place servants, for the same crime, to be discharged, and declared infamous; nor shall they afterwards be admitted into any services in these provinces.

37. All herrings sent to Hamburgh, and in that course, must be branded with the seller's mark, and the cypher of the year. All others with the single brand only, as is before directed.

38. Herrings once exported abroad, shall not be received back, to be filled or cured anew, on pain of confiscation.

39. For the preservation of this most important and advantageous branch of commerce, no one shall, in these provinces, land, pack, or otherwise cure or prepare any Maesterlandish or other foreign herrings, but only coopered up in casks, and sent away, in the same condition as imported, under pain of confiscation.

40. All penalties, the division whereof is not previously specified, are to be one third to the informer, one third to the officer executing the process, and one third to the poor.

41. And that no buss-master may plead ignorance of these our ordinances, they shall be obliged to take authentic copies with them to sea.

42. No

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42. No officer or fiscal shall compound with delinquents, without the express approbation of the burgomaster or treasurer of the city, or place where the crime was committed; and if such composition be made without their consent, the same is hereby declared illegal and void; and the burgomasters, &c. may pursue the offender, and recover the penalty notwithstanding; and apply the one third part, usually appropriated to the officer who executes the process, to the use of the city.

43. The deputies of the cities trading in the great fishery, may, in the future, make such bye laws as they find conducive to the welfare of this lucrative branch of commerce.

And as we are clearly apprised, that all the foregoing articles are for the preservation and bettering this beneficial branch of trade, therefore we do command all and every one, whom it may concern, punctually to observe these our regulations, under the pains and penalties affixed to each article, in case of contravention. And as we well understand these our ordinances, so will we they be duly executed against the contraveners. And that no one may plead ignorance of the same, we do hereby command and authorise our head door-keeper, or beadle of our court of justice in Holland, to publish the substance of these in all the cities and places of Holland, and West Frizeland, wherever it shall be necessary.

Done at the Hague in the form of a Placart Geresumeert, and attested under the common seal of the States of Holland, the 10th of May, 1651, and again renewed, and the second article amplified the —

By Order of the States.

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The Form of the Oath to be taken by the Buss-Master, trafficking in the Herring Fishery, in order to his obtaining the Act of Consent.

I, A. B. master of a herring ship, and two or three of my seamen, do promise and swear, that we will not, before the 24th of June, nor after the 31st of December next ensuing, any herring nets throw into the sea, nor before wet them to catch herrings.

Secondly, That I will not personally, or by connivance, do, or permit any herrings to be delivered at sea, to any person or persons whatsoever, out of my vessel, directly or indirectly, but only to such ships from Holland and West Frizeland, which have and produce the due act of consent. At the top printed "*A Buss,*" and underneath the seal of the great fishery, and signed by one of the Secretaries of the under-mentioned cities, viz. Delft, Rotterdam, Scheidam, Briel, and Enchuysen, to whose ships I shall, to the 15th of July, and no longer, deliver herrings; nor put on board each vent-jagger more than one small barrel of fish for the book-keeper.

Thirdly, the barrels shall not be more than once packed and heightened; and special care taken to preserve the bloody pickle, nor waste the same as little as possible.

Fourthly, I will take due care that the herrings are laid even in their rows, not thrown in with baskets or trays confusedly, nor the kinds mixed, bloom laid, or falsified.

Fifthly, That I will not, new herrings caught in the one night, mix with those taken of another; but will specially declare what herrings are taken each night distinctly.

Sixthly,

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Sixthly, That I will not sell or barter in Shetland, or at sea, to, or with any foreigner, salt, pickle, barrels, hoops, staves, fishing tackle, yarn, lines, or any other fishing appurtenants, for any kind of merchandize whatsoever; nor make presents of, or connive at any being made by the ship's crew, directly or indirectly. And farther, that my ship's crew shall have no more for a present, than each a small kinelkin, or one eighth of a barrel for each voyage. And that I will in all things govern me according to the directions of the placarts and ordinances regarding the herring trade, which have been delivered me.

So verily help me God Almighty.

The Form of the BUSS-MASTER'S *Oath after his Return from Fishing.*

Appearing this day before the Lords N. N. N. N. in the city of I, A B, and C D, E F, G H, my own mariners, respectively on our solemn oaths declare, that we did, in conformity to the act of consent, duly equip a ship for the herring trade; and no fishing tackle, before the 24th of June, did throw into the sea, or shot out, or wetted: nor have delivered out of the vessel, herrings to any person or persons whatsoever; nor have caused or connived at any such thing being done, directly or indirectly, in any manner or form whatsoever; except only to such ships or vent-jaggers of Holland and West Frizeland, who have produced a qualified act of consent, which we perused: nor to them after the 15th of July last: nor have fished for, or caught any other herrings

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but what are specified in our report, delivered in to the treasurer.

Lastly, I, A. B. do declare, that no more has been given to each mariner of my crew, than one kinelkin, or eighth part of a barrel of herrings, each voyage.

So verily as God Almighty must help us.

The Oath taken by the BUSS-MASTER, *and his Crew, on their Outset to the* DOGGER-BANK.

I, A. B. sailing with fishing tackle upon the Dogger trade, and all my mariners, promise and swear, that we will not carry with us this voyage any more than twenty nets: that we will not catch any herrings before St. John's Day; nor before that time will gut, salt, nor put any in pots or barrels; nor deliver any at sea, gutted or not; nor bring any home to sell, make presents of, or otherwise distribute.

So verily help us God Almighty.

The Oath of the same, on their Return from Fishing on the DOGGER-BANK.

We do hereby declare on our solemn oath, in consequence of that previously taken, that we have not, during this voyage, had on board any more than twenty nets; nor before St. John's Day did gut, salt, pot, barrel, lay up in any vessel, give away or bring home; nor have nor shall bring ashore any herrings for to sell, make presents of, or distribute in any ways howsoever.

So help us, &c.

Oath

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Oath of the VENT-JAGGERS *.

We promise and swear not to take on board, from any ships or busses but those of Holland and West Frizeland, any herrings, nor purchase from them, but such wherewith a due attestation is given, signed by the masters and two or three of their mariners respectively; and wherein is contained the quantity, and an assurance of their being gutted, salted, and laid, according to the direction of the placart: nor such herrings taken on board will we carry any where, but to such cities or places in the said provinces, where brands and certificates are given: nor will we our act of consent deliver or lend to any person, to make use of at sea; nor after the 15th of July will take any herrings on board, directly or indirectly, except one eighth of a barrel from each buss for the book-keeper, under the penalties in the placarts and ordinances, concerning vent-jaggers, contained.

And we do further promise and swear, that we will not sell, make presents, barter, truck, or otherwise howsoever dispose of any salt, pickle, barrels, hoops, staves, fishing-tackle, nets, yarn, fishing line, or any other materials in the fishery, nor merchandizes of any kind or denomination, to the people of Shetland, or other foreign nation whatsoever, nor connive at the same being done, directly or indirectly.

And finally, we promise immediately after our return home, to take the oath of purgation.

So verily, &c.

The Oath of Purgation.

I, A. B. and two of my mariners swear, that the oath taken by me on receiving the act of consent, has been

* The vent-jaggers are the persons employed on board vessels which fetch the pickled herrings from the fishermen, and carry them on shore.

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duly observed in every point, without neglecting the least part thereof.

So verily, &c.

The ACT *of* CONSENT.

We the Burgomasters and regency of the city of consent, that may sail with his herring-buss to the North Sea, there to follow the herring trade, and has sworn before us, that he is duly equipped with fishing tackle, salt, barrels, mariners, and all other requisites belonging to that commerce, according to the burthen of his vessel; and that he will not, before the 24th of June, nor after the 31st of December next ensuing, put into the sea any fishing tackle, nor wet them to catch herrings; nor will himself, nor connive at others putting fish on board any vessels, other than of the provinces of Holland and West-Frizeland, having an authentic act of consent, with an "*herring-buss*" printed on the top, and at the bottom the printed seal of the great fishery, and signed by the secretary of the city from whence he sailed; in which vessel he may to the 15th of July inclusive, put on board the herrings he has taken. And that he will exactly set down upon the schedule the mark of the barrels, and the night of the fish being taken, which he so disposes of; and that he will not pack or heighten the barrels with crooked herrings more than once, and take care that as little pickle be spilt as possible; that he will land his fish only in the provinces of Holland or West-Frizeland, and with three of his mariners report his cargo within three days after his return; that his herrings are laid in even rows, from end to end, not flung in with baskets or trays, nor mixed, laid crossways, or falsified; that he, no salt, pickle, barrels, hoops,

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hoops, staves, herring tackle, yarn, lines, other fishing furniture, or merchandizes of any denomination, will sell or otherwise dispose of in Shetland, Scotland, at sea or on shore, to any foreign nation whatsoever, or connive at the so doing, directly or indirectly, under the penalties in the ordination mentioned; and that he will always govern himself according to the placart and ordinances made in behalf of the herring trade, the which are given him for his better direction herein.

So verily must God Almighty help him.

In witness whereof, the seal of the great fishery is hereunto affixed, and signed by our city secretary, the day of

N. N.

(A printed Herring-Buss.)

We the Burgomasters of the city of consent and admit with his ship to sail amongst the busses and herring ships, and take on board herrings from them, until the 15th of July, and no longer, conformable to the ordinances made in the behalf of the vent jaggers; and that all the herrings which he shall take on board at sea, shall be only from the busses and ships of Holland and West-Frizeland, and that he will of each master take an attestation signed by him and two or three mariners, mentioning the quantity of herrings put on board, and that they were caught, gutted, salted, and laid in the barrels, according to the direction of the placart. As also that he will not receive on board any herrings to make presents of, except a small kinelkin for the book-keeper, nor carry his herrings any where but where there is brand and certificate, nor will lend to any one his act of consent, nor will sell or make

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presents of, barter or exchange any salt, pickle, barrels, staves, hoops, fishing tackle, nets, yarn, line, or any other thing belonging to the fishery, nor any kind of merchandize, either at Shetland, Scotland, nor any where else, at sea or on shore, nor to any foreigner, directly or indirectly, and that he will take the oath of purgation immediately after his return.

So verily God must help him.

In witness whereof, at the top, is printed a buss or ship, with the date of the year, and at the bottom is printed the seal of the great fishery, and signed by our secretary, the day of

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Instructions for the Mates, against not rightly managing, sorting, salting, and laying the Herrings.

The deputies of the great fishery and herring navigation of Holland and West-Frizeland, being credibly (and with great indignation) informed, that some mates neglecting their duty, do not rightly manage, sort, salt, or lay the herrings, notwithstanding the good orders instituted by the general placart, relating to the catching, salting, and managing of herrings by their Noble Great Mightinesses, dated May 10, 1651, lately renewed and explained especially by the 12, 13, 14, and 15 articles; a copy of which, agreeably to the 41st article of the said order, is yearly delivered to the said mates, and which they solemnly swear to, as a warning, in order to prevent all abuses and misdemeanors, as it is ordered by the said deputies, by virtue of the said placart; by which, it is to be feared, that the vending and good reputation of Dutch herrings in foreign markets, already decreasing, may entirely come to cease, and on the contrary

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contrary be despised, to the great loss and damage of the trade, and of consequence to the ruin of the common herring and great fishery, it being so essential a branch of the commerce and welfare of these countries, and inhabitants thereof, if it is not speedily and strictly prevented; the said deputies, with the advice and concurrence of some of the owners, stewards, and merchants in the herring trade, have agreed and ordained, in order to prevent those gross abuses and neglect of duty, for the preservation and re-establishing the herring and great fisheries, as they do by these presents ordain, by way of renewing and explaining the before-mentioned good orders, that the mates of the herring vessels shall not mix several sorts of herrings together, but shall sort them properly, viz. full with full, measure with measure, and small with small. The mates shall, upon account of extraordinary large quantities catched, and want of time to sort herrings properly, upon their arrival, enter them as unsorted herrings. Further, they shall salt the herrings properly, and the large ones not less than four barrels of salt to a last; excepting only the small barrels; as likewise clean them, and afterwards lay them crossways in the barrels. Commanding every mate to govern himself by this exactly, upon the penalty (over and above the action upon the case of perjury) of 300 florins, for every mate whose herrings shall be found not sorted in the manner above mentioned; and he shall not have any certificate to go on the herring fishery afterwards. But with regard to the not laying the herrings crossways in the barrels, a penalty of six florins each barrel. The said penalties to be applied agreeably to the 40th article of the above placart, one third to the informer or informers, whether mariners or other persons, one third to the officer who shall take the information,

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information, and, lastly, one third to the poor. Moreover, the bad sorted herrings, viz. the full mixed with measure, as also measure mixed with full, shall be marked as unsorted, and with regard to the full and measure mixed with small, they are to be sold as small, and shall be accounted and paid for as such by the buyer. The above orders and penalties to remain in full force, and at the risk and charge of the mates. And to the end that no body shall plead ignorance, the deputies have ordered these to be published and and affixed at the proper places.

Done at Delft, by order of the said deputies.

The Burgomasters and rulers of the city of Scheidam, do give consent to , that he, with his herring vessel, may sail to the Northern Sea, to exercise his herring fishery there, and he has swore by solemn oath, that he is equipped with proper tackle, salt, barrels, men, and other utensils proper for the herring fishery, according to the bigness of his vessel; as also, that he will not throw out any herring tackle, nor make any before the 24th of June, nor after the 31st of December next; also that he will not deliver to any body whatsoever any herrings at sea, nor suffer any to be delivered out of his ship by any other person, directly or indirectly, in any shape, but to such vessels only coming from Holland and West-Frizeland, as shew a proper certificate, with a herring-buss at the top, and at bottom the seal of the great fishery, and signed by the secretary of the town where he comes from, to which vessels he may deliver his herrings until the 15th of July, and no longer. That he shall express in the list, exactly the marked barrels, and what night the herrings he delivers were caught: further, that he shall not fill up his barrels more than once with other herrings, and take care that

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that as little of the blood pickle as possible shall be let off: and further, that he shall bring all the herrings he catches in the province of Holland and West-Frizeland, as likewise together with three of his seamen, faithfully to enter the said herrings three days after his arrival at the longest; also, that he shall take as much care as possible that the herrings are laid even from one bottom to another, and that they are not thrown into the barrels with baskets or shovels, nor mixed or falsified. That he shall not carry on shore in Shetland, Scotland, or other places, nor sell to any foreign nation at sea, nor exchange or make presents of any salt, pickle, barrels, hoops, tackle, thread, hook tackle, or any other fishing tackle, nor any merchandize under what denomination it may be, nor take any goods upon freight out or homeward bound, nor suffer it to be done directly or indirectly, on pain as mentioned in the instructions; and shall farther regulate himself according to the placarts made relating to the herring fishery, which are delivered to him for that purpose.

So truly might God Almighty help him.

In witness whereof, the seal of the great fishery is put hereto, and signed by the secretary of the town.

The THANKS *of the Society were this Session voted to Dr.* ALEXANDER ANDERSON *of the Royal Botanical Garden of St. Vincent, for the following Communications received from him.*

SIR,

FROM my long silence you will conceive me either neglectful or ungrateful to the Society, but this is not the case. The

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The reason is, I had nothing of consequence to mention relative to the garden, and it would be trespassing on your time, and interfering with matters of consequence by troubling you with trifles.

Although I have introduced a number of plants in the course of last year from different quarters, yet few of them are yet known to possess valuable properties, except some useful woods.

I am grieved to inform you, that I have lost one of my nutmeg trees; unfortunately the other, which prospers luxuriantly, turns out to be a male plant, consequently worth nothing. I blame myself, in some measure, for this loss, by taking too much care of it, and not letting nature take her own way. Unluckily the war precludes any correspondence with Cayenne, or I would have replaced it from thence. The same cause has cut of all supplies from other parts. Through the medium of a gentleman who was here last year from Cuba, I expected to have had, before now, some of the productions of Mexico and adjacent parts of the continent, particularly Myraxylon, or Balsam of Peru; however, if I do not procure it through that channel, I have found out another from whence I have hopes.

The Gomertur Palm, which produces the material for cordage in the East Indies, is thriving here surprisingly, and, I think, might be rendered a valuable production to these islands. The mode of its producing the fibrous web, and the guard or protection surrounding, clearly points out that nature intended it for the use of man; one tree produces an astonishing quantity. I think the fibres from the plants in this garden are stronger than the specimens I have seen from the East Indies. A small piece of the web, with its protector, I now transmit you. I have great reason to think that

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that but few plants have been raised by the planters in the different islands, from the large quantities of seeds I have dispersed amongst them. The fact is, that no attention, except by a few individuals, is paid to any other plant but the sugar cane, and no other is in estimation with them.

The bread-fruit, although one of the most valuable productions yet sent them, is neglected and despised, unless by a few persons. They say that negroes do not like it, and will not eat it, if they can get any thing else; but this is not really the case, as I know, and can declare from experience, that the very reverse is the fact, when once they are a little accustomed to it. The fact is, that the planters hate giving it a place on their estates, as they regard it as an intruder on their cane land, and they dislike any other object but canes. As to futurity, they think nothing of what may be the wants of themselves or negroes three or four years hence. Even their most valuable mill-timber, than which nothing is more daily wanted by them, they are constantly destroying instead of preserving. They import it at an exorbitant rate, and the importation is precarious. With proper economy and management, there are few necessaries for themselves or negroes, but which might be raised on their own estates, instead of importing them from America, unless it be lumber, and, probably, even that might be done in time in the back, cool, and mountainous situations. I am trying what may be done from the pine tribe.

I am happy that many are now paying some attention to the cinnamon, as the demands on me for the plants are frequent, which I impute to the specimens of it which I have shown.

The black-pepper plants have not yet produced; I have them in plenty, and am trying them in various situations, and

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and can easily increase them by cuttings; unluckily I can procure no information as to their culture in the East Indies, or of the soil or situation in which they thrive best.

I send you some more cloves, the last year's produce of two small trees; next year I expect from several others: you will also find inclosed a lump of gum resin from cochola odorata. As it issues in large quantities from wounds in the bark, it might be procured in plenty from Trinidad, if found useful. Trees of it, of enormous size, are abundant there. Other specimens of terra japonica would have been sent with some other articles, if all my attention had not been engrossed about the late addition to the garden: the same cause has prevented me from excursions to other islands for larger supplies of plants. I remain, with most sincere regard,

Sir,

Your obliged and obedient Servant,

ALEXANDER ANDERSON.

St. Vincent, June 9, 1806.

To C. TAYLOR, M. D. SEC.

SIR,

SINCE your last letter to me, very little matter interesting to the Society has occurred, and few acquisitions made to the garden subservient to medicine or commerce. War interrupts correspondence in natural history as much as speculations in commerce.

For 18 months past I have had expectations of some useful plants from Mexico, and other Spanish colonies in that quarter,

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quarter, by the way of Cuba, but from thence the transportation must be circuitous by North America, and after that subjected to loss and interruption, before they can reach St. Vincent. I have therefore given up all hopes whilst the war continues.

As the Society may be desirous to know the present state of the garden, I have transmitted a catalogue of the variety of plants it contained on the 24th September last; there are many more from different quarters received without names, or those that are known by the aborigines, and I cannot arrange them until they flower. I am, with great respect,

Sir,

Your most obedient Servant,

ALEXANDER ANDERSON.

Botanical Garden, St. Vincent,
Nov. 1, 1806.

To C. Taylor, M. D. Sec.

CATALOGUE OF PLANTS

In His Majesty's Botanical Garden in the Island of St. Vincent, September 24, 1806.

Commercial and Medicinal.

Acorus calamus
Acer saccharinum
Aloe perfoliata
Amomum Zingiber
Asclepias asthmatica
Aristolochia odoratissima
Aristolochia trilobata
——— anguicida
Arnica montana
Bixa orellana
Cactus cochenilifer
Canella alba
Caryophyllus

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Caryophyllus aromaticus
Cassia senna
——— glauca
——— fistula
——— javanica
Cinchona cymosa
——— Caribæa
Convolvulus jalapa
——— turpethum
Copaifera officinalis
Coriandrum officinale
——— testiculatum
Curcuma longa
Cycas revoluta
Dorstenia contrayerva
Dracæna draco
Epidendrum vanilla
Fraxinus rotundifolia
——— ornus
Gossypium arboreum
——— hirsutum
——— religiosum
Guaiacum officinale
——— sanctum
Hæmatoxylon campechianum
Kæmpferia galanga
Laurus cinnam
——— cassia
——— camphora
——— sassafras
Mimosa nilotica
——— Senegal
——— catechu
Morus tinctoria
Myristica officinalis
Myrtus pimenta
Olea europæa
Pedalium murex
Piper nigrum
——— longum
——— cubeba
——— Betle
Quassia amara
——— simarouba
——— excelsa
Quercus suber
Rheum compactum
Ricinus communis
Saccharum officinarum rubrum
Sesamum indicum
——— orientale
Smilax sarsaparilla
Thea viridis
——— Bohea
Theobroma cacao-Caraccas.

ESCULENTS

Alpinia globulifera (Maranta ?)
Amaranthus viridis
——— caudatus
——— melancholicus
Arachis hypogea
Areca oleracea
——— alpina
Artocarpus incisus Otaheite
——— E. Indies
——— seminifer
Arum esculentum
———sagittifolium
Canna indica

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Canna indica, floribús maculi
Cleome pentaphylla
Cocos aculeatus
Convulvulus batatas
——— esculentus
Cucurbita pepo
——— verrucosa
Cytisus cajan
Dioscorea sativa
——— alata
——— bulbifera
——— quinqueloba
Dolichos unguiculatus
——— uncinatus
——— purpureus
——— tuberosus
Glycine subterranea
Helianthus tuberosus
Hibiscus esculentus
——— sabdariffa
Holcus saccharatus
——— sorgum
Jatropha manihot
Musa paradisiaca. Otaheite.
Myrosma tuberosa
Oryza sativa
Paripou Palm
Phaseolus lunatus
——— max
——— glaber
Pistacia terebinthus
Ravenala edulis
Solanum melongenum
——— lycopersicon

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Clusia alba
—— flava
Commelina communis
Convolvulus brasiliensis
Conyza lobata
Costus spicatus
Croton flavens
——— argenteum
Dolichos pruriens
Eryngium fœtidum
Eupatorium nervosum
Euphorbia thymifolia
Galega officinalis
Gardenia genipa
Geoffrea inermis
Guilandina bonduc
Heliconia bihai
Heliotropium indicum
Hura crepitans
Jatropha curcas
——— millefida
——— gossypifolia
Ilex vomitoria
Iris martinicensis
Justicia pectoralis
——— procumbens
Lantana involucrata
Lobelia siphilitica
——— assurgens
Melissa officinalis
Mimosa pudica
Momordica charantia
Nepeta pectinata
Nerium antidysentericum
Ocymum americanum
Pancratium cainbœum
Parthenium hysterophoros
Passiflora murucuja
——— lutea
Paullinia pinnata
Petiveria alliacea
Phytolacca icosandra
Picramnia antidesma
Piper Amalogo
—— reticulatum
—— decumanum
—— obtusifolium
—— pellucidum
Plumbago scandens
Plumeria rubra
——— alba
Poinciana pulcherrima
Rauwolfia nitida
Rosmarinus officinalis
Ruellia tuberosa
Ruta graveolens
Scoparia dulcis
Securidaca scandens
Sisyrinchium latifolium
Smilax china
——— laurifolia
Spilanthus salivaria
——— urens
Solanum triste
——— racemosum
Spigelia anthelmentica
Tournefortia volubilis
Triumfetta Bartramia

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Triumfetta lappula
Vandellia diffusa
Verbena jamaicensis
Waltheria americana

In Economy.

Agave americana
——— vivipara
——— cubensis
Alpinia altisssima
Amyris elemifera
——— balsamifera
Andropogon bicornis
Arundo donax
Bignonia paniculata
Boerhavia diffusa
Bromelia pitta
Capraria biflora
Carapa guianensis
Carthamus tinctorius
Cecropia peltata
Ceratonia siliqua
Cordia dichotoma
Crescentiacujete
Cucurbita lagenaria
Daphne occidentalis
Erythrina corolladendrum
——— excelsa
Elais guineensis
Ficus tinctoria
Galega toxicaria
Gleditsia triacanthos
Gomutu, E. India Palm
Gouania scandens
Guilandina moringa
Hibiscus tiliaceus
Hippomane biglandulosa
Isatis tinctoria
Maranta arundinacea
Mimosa unguis cati
——— tortuosa
——— eburnea
——— ceratonia
——— tamarindifolia
——— intsia
Momordica operculata
Morus papyrifera
Myristica americana
Ochroma lagopus
Oxalis frutescens
Pandanus odoratissimus
Parkinsonia aculeata
Phaseolus mungo
Phormium tenax
Piscidia erythrina
Pisonia aculeata
Poinciana coriaria (cæsalpinia)
Prunus noyeau
Pterocarpus draco
Rhizophora mangle
Sapindus saponaria
Sida indica
——— alnifolia
Theobroma Guazuma
Trixis toxicaria
Vitex trifolia
Volkameria aculeata
Zanthoxylon clava Herculis
——— tinctorium

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VALUABLE WOODS.

Adelia arborea
Amerimnon album
Arundo bambos
——— spinosa
Avicennia tomentosa
Bactris clavata
Bignonia Leucoxylon
——— pentaphylla
——— serratifolia
——— monophylla
Bucida buceras
Bumelia nigra
——— latifolia
——— excelsa
——— tomentosa
Cæsalpinia cristata
Calophyllum calaba
——— acuminatum
Cedrela odorata
Chrysophyllum glabrum
Citharexylon cinereum
——— quadrangulare
Coccoloba pubescens
Cordia Geraschanthus
Coumaroriuna odorata
Cupressus disticha
Diospyros ebenum ?
Hernandia sonora
——— ovigera
Hippomane mancinella
Hymenæa curbaril
Juglans alba
Juniperus bermudiana
Juniperus virginiana
Laugeria excelsa
Laurus paniculata
——— borbonia
——— salicifolia
——— caribæa
——— nigra
Mimosa peregrina
——— lebbeck
——— odoratissima
——— arborea
——— grandis
Myrodia turbinata
——— patens
Myrtus latifolia
——— crassifolia
Parivoa grandiflora
Pinus sylvestris
Piratinera guianensis
Polypodium arboreum
Possira simplex
——— cauliflora
Petrocarya exsucca
Quercus robur
——— rubra
——— alba
——— nigra
——— phellos
——— sempervirens
Robinia pseudacacia
——— violacea
Sophora arborea
Sterculia fœtida
——— platanifolia

Sturculea

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Sterculia ivira
——— hirsuta
Swietenia mahagoni
Tectona grandis
Tetraptera aceroides
Theobroma caribæa
Trichilia arborea
Vitex divaricata
Vouapa simiri

FRUITS.

Achras sapota
——— mammosa
——— argentea
Adansonia digitata
Aleurites triloba
Anacardium occidentale
Annona muricata
——— reticulata
——— tuberculata
——— cherymoa
Artocarpus integrifolius
Averrhoa bilimbi
——— carambola
Bagassa guianensis
Blakea cauliflora
——— racemosa
Bromelia pinguin
——— karatas
Cactus melocactus
——— grandiflorus
——— triangularis
——— pereskia
Carica papaya. Africa
Carolinea princeps
Chrysobalanus icaco
——— microcarpa
Chrysophyllum cainito
Cicca disticha
Citrus aurantium
——— decumanum
——— medica
——— myrtoides
Coccoloba uvifera
——— barbadensis
Cookia grossularoides
Cocos nucifera
Cuma guianensis
Cratæva capparoides
Dialium guineense
Diospyros lotus
Duroia eriopila
——— glabra
Eugenia malaccensis
——— jambos
——— floribunda
——— uniflora
——— tainitensis
Ficus carica
——— beughalensis
——— trigona
Jambolifera pedunculata
Inocarpus edulis
Juglans sativa
Laurus persea
Macoubea guianensis
Malpighia glabra
——— lucida
——— urens

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Mammea americana
Melicocca bijuga
——— dioica
Mimosa fagifolia
——— inga
——— farinosa
Mangifera indica
Mouriri lucida
Musa sapientum rubra. Otaheite
Omphalea diandra
Parinari montana
Passiflora laurifolia
——— quadrangularis
——— maliformis
——— fœtida
Pekea tuberculata
——— trifolia
Phœnix dactylifera
Psidium maliforme
——— guianense
——— aromaticum
——— polycarpon
Punica granatum
Rhamnus jujuba
Saouari glabra
Sorbus domestica
Spondias mombin
——— myrobalanus
——— dulcis
Tamarindus indica
Terminalia catappa
Ximenia americana

Exotics, *curious or ornamental.*

Abroma augusta
Acrostichum rhizophyllum
Agave soboliflora
Ægiphila martinicensis
——— manabea
——— scandens
Adelia acidoton
Adenanthera pavonina
Æschynomene grandiflora
——— sesban
——— indica
——— aculeata
——— sensitiva
Aletris hyacinthoides
Allophyllus racemosus
Alpinia grandifolia
——— dichotoma
——— capitata
——— maculata
——— polystachia
——— hirsuta
Althæa racemosa
Alstromeria salsilla
Amaryllis belladonna
——— formosissima
——— longifolia
——— humilis
——— sarniensis
——— vittata
——— aurea
——— atamasco

Amerimnon

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Amerimnon latifolium
——— flexuosum
——— volubile
Amomum mioga
Amorpha fruticosa
Andromeda paniculata
Anethum graveolens
——— sowa
Anguria heterophylla
——— glandulosa
Anisophyllum pinnatum
Anthemis chia
Aukuba japonica
Annona asiatica
——— palustris
——— exsucca
Apalatoa spicata
——— aptera
Apeiba tibourbou
Aralia capitata
——— heterophylla
Ardisia elusiæfolia
——— punctata
——— pulchella
——— parasitica
Areca catechu
Aristolochia glandulosa
Arctotis tristis
Arethusa lucida
——— picta,
——— pusilla
Arum arboreum
——— seguinum
——— maximum
——— fœtidum
Arum lingulatum
——— hederaceum
——— bicolor
——— repandum
——— hastatum
Asclepias viminalis
——— repanda
Asphodelus fistulosus
Asplenium soboliferum
Aster divaricatus
——— dumosus
——— vernus
Athanasia annua
Atragene austriaca
Atropa arborescens
——— physaloides
Azalea rosea
Bactris minor
——— sagittata
——— gracilis
Bannisteria laurifolia
——— chrysophylla
——— nitida
——— latifolia
——— dichotoma
——— cordifolia
——— villosa
——— mutica
——— purpurea
Basella alba
——— rubra
Bauhinia divaricata
——— variegata
——— tomentosa
——— aculeata

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Begonia glabra
——— hirsuta
Bellis maritima
Berteria guianens's
Besleria melittifolia
——— lutea
——— serrulata
——— cristata
——— trinervia
——— corymbosa
——— pulchella
Betula alnus
Bignonia catalpa
——— æquinoctialis
——— pubescens
——— crucigera
——— echinata
——— glandulosa
——— argentea
——— stipulacea
——— ramiflora
——— inflata
——— punctata
——— tubulosa
——— fluviatilis
——— stans
——— incisa
——— radicans
——— indica
——— filicifolia
Blakea trinervia
Blechnum heptaphyllum
Bombax carolineoides
Bontia daphnoides
Bromelia polystachia
Brownea speciosa
Bryonia laciniosa
Buttneria aculeata
——— latifolia
Cacalia coccinea
Cactus phyllanthus
——— tetragonus
——— heptagonus
——— peruvianus
——— pendulus
Cæsalpinia sappan
Canna glauca
Casearia ramiflora
——— nitida
——— crenata
——— undulata
Calamus raphia
Calinea dioica
Calycanthus florida
Camellia japonica
Cananga laurifolia
Capparis cynophalaphora
——— tortuosa
——— breynia
——— frondosa
——— jamaicensis
Cardiospermum fruticosum
Caryota urens
Cassia viminea
——— bacillaris
——— sophera
——— glauca. E. Indies
——— planisiliqua
——— bracteata
——— floribunda

Cassia

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Cassia c
——— p
——— g
Casine
Casuari
———
Ceanotl
Celosia
———
———
———
Celtis l
Centau
Cephae
———
Cerber
Cerintl
———
Cestrui
———
———
Chelon
Chima
Chioco
Chiona
Chome
Chrysa
———
Chryso
Cipura
Cissus
Cleome
———

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Conyza arborescens
——— trinervia
——— alata
Corchorus fruticosus
——— olitorirus
——— capsularis
Cordia macrophylla
——— sebestena
——— juglandifolia
——— virgata
Coreopsis reptans
——— chrysantha
Cornus florida
Cornutia pyramidata
Coronilla scandens
Corypha frondosa
Costus arabicus
——— speciosus
——— malaccensis
Couratari guianensis
Cratæva capparoides
Crescentia cucurbitina
Crinum americanum
——— asiaticum
——— zeylanicum
Crotalaria arborea
——— laburnifolia
——— verrucosa
——— retusa
——— incanescens
——— chinensis
——— procumbens
——— lateriflora
——— alata
Croton aromaticum
——— fœtens
——— punctatum
——— gossypifolium
——— pallens
——— polygamum
——— trilobum
Cupania americana
——— macrophylla
Curatella americana
Cynanchum maritimum
——— hirtum
——— suberosum
——— latifolium
Cytisus tomentosus
Dalbergia procumbens
——— caudata
Daphne cneorum
——— collina
Datura fastuosa
——— tatula
Dianella cærulea
Digitalis obscura
Dipsacus lacinatus
Dioscorea vivipara
——— filiformis
——— guianensis
——— rajanoides
Diospyros tetrasperma
——— inconstans
Dodonæa viscosa
——— triquetra
Dolichos lablab
——— lignosus

Dolichos

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Exacum guianense
Fagara myrtoides
Fraxinus crispa
——— lentiscifolia
Ficus retusa
—— religiosa
—— indica
—— americana
—— linifolia
—— virens
—— racemosa
—— pertusa
—— rigida
—— hirsuta
—— glauca
Fuchsia coccinea
Galega carribæa
——— purpurea
——— virginiana
——— dichotoma
——— hirsuta
Gardenia florida, flor. simplicibus
——— flor. plenis
——— thunbergia
——— crinita
——— armata
——— rania
——— aculeata
——— dumetorum
——— longiflora
——— microphylla
Gentiana coutoubea
Gesneria tomentosa
Gesneria coccinea
Glycine caribæa
——— picta
——— rubicunda
——— bimaculata
Gomphia nitida
Grewia pilosa
Guettarda speciosa
——— scabra
——— lucida
——— salicifolia
——— macrophylla
Gustavia augusta
Gypsophila perfoliata
Hamellia coccinea
——— chrysantha
——— corymbosa
Hedyosmum articulatum
Hedysarum latifolium
——— gangeticum
——— vespertilionis
——— gyrans
——— bupleurifolium
——— linifolium
——— lagopodioides
——— glomeratum
——— altissimum
——— triquetrum
Helicteres isora
——— baruensis
Heliconia marantifolia
——— psittacorum
——— flexuosa
——— hirsuta

Heliconia

Hel
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Ixia chinensis
Ixora coccinea
——— alba
——— secunda
Kæmpferia coronaria
Kitaibela vitifolia
Kœlreuteria paniculata
Lagerstroemia flos reginæ
Lantana radula
——— camara
——— aculeata
——— bullata
——— annua
Latania. Palm
Laurus nobilis
——— indica
——— fulgens
——— verticillata
——— ecalyculata
Lavenia decumbens
Lawsonia inermis
——— spinosa
Lecythis bracteata
Ligusticum levisticus
Leonurus marrubiastrum
——— tataricus
Legnotis elliptica
Ligustrum vulgare
Limodorum Tankervilliæ
——— altum
——— palmæfolium
——— corniculatum
——— spathaceum
——— parasiticum
Linum narbonense
——— strictum
Lisianthus glaber
——— chelonoides
Limonia triphylla
——— mauritanica
Liquidambar styraciflua
Liparia pinnata
Lobelia surinamensis
——— racemosa
Lycium japonicum, flor. plenis
Lygeum spartum
Macrocnemum coccineum
Magnolia cœrulea
Malachra radiata
Malanea sarmentosa
Malpighia nitida
——— mourila
——— crassifolia
——— coriacea
——— coccigera
Malvaviscus populneus
Mammea littoralis
——— verrucosa
Manettia coccinea
——— alba
Maranta sylvestris
Margravia umbellata
Marila racemosa
——— speciosa
Medicago scutellata
——— orbiculata
——— aculeata
——— hispida

Medicago

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Medi
Melal
Melas
Melia
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Myginda retusa
——— lineata
Myrobalanus fertilis
Myrospermum elegans
Myrsine africana
——— retusa
Myrtus communis, latifolia et angustif.
——— fragrans
——— virgultosa
——— disticha
——— crenulata
——— buxifolia
——— obtusifolia
——— cerasina
——— mini
——— lucida
——— ramiflora
——— paniculata
Nerium oleander, rubrum et alb.
Nigella sativa
——— damascena
Ocymum gratissimum
——— album
——— tenuiflorum
——— thyrsiflorum
Olea fragrans
Onopordum illyricum
Oenothera grandiflora
——— purpurea
Ophioglossum scandens
Origanum majoranoides
Oxalis frutescens
Panax morototoni
Panax attenuata
Pancratium amboinense
Parivoa tomentosa
Paullinia asiatica
——— glauca
——— punctata
——— capsularis
——— vespertilionis
——— multiflora
——— biflora
——— cærulea
——— serrata
Pelargonium capitatum
——— grossularioides
——— zonale
Pentapetes phœnicea
Petræa volubilis
——— erecta
Pittosporum lanceolatum
Petrocarya rigida
Phaseolus caracalla
——— vexillatus
——— lathyroides
——— aconitifolius
Phœnix farinifera
Phyllanthus racemosa
——— conami
——— longifolia
——— mimosoides
——— glauca
Plumeria obtusa
——— pudica
Piper geniculatum
——— verrucosum

Piper

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Rondeletia arborea
Rolandra argentea
Rosa semperflorens
Rubus fruticosus
Rudbeckia triloba
——— caribæa
Ruellia ciliaris
Rumex aureus
——— dentatus
——— vesicarius
Ryania speciosa
Sagittaria sagittifolia
Sagus? Palm
Salix babylonica
Salvia coccinea
——— pseudococcinea
——— dominica
——— nilotica
——— hispanica
——— viridis
——— æthiopis
——— latifolia
Samya serrulata
——— crenulata
Sambucus ebulus
Sapindus auriculata
Saponaria vaccaria
Satyrium elatum
——— spirale
Saururus cernuus
Schousbœa speciosa
——— oppositifolia
Schradera elusioides
Sebacea aspera
Serrulata anthelminthia
Sida periplocifolia
——— atrosanguinea
——— cristata
——— secunda
——— multiflora
——— cistoides
Sideritis montana
Sideroxylon dioicum
Sideroxyloides ferreum
Silene rubella
——— viridiflora
Siphonanthus indica
Sloanea dentata
Solanum laurifolium
——— verbascifolium
——— bombense
——— glanduliferum
——— diphyllum
——— pulchellum
——— paniculatum
——— hirtum
——— fuscatum
——— triphyllum
——— mammosum, 5 dactylon
——— sessilifolium
——— obscurum
——— bahamense
——— polygamum
——— flexuosum
——— scandens
Solandra grandiflora
Sophora occidentalis
——— tetraptera

Soramia

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Volkameria mollis
Vouapa bifolia
——— pinnata
Utricularia alpina
Uvaria longifolia
Wedelia frutescens
Weinmannia pinnata
Xeranthemum lucidum
Ximenesia insiloides
Xylophyllum latifoliums
Xiphidium album
Xyris indica
Yucca gloriosa
Zamia integrifolia
Zanthoxylon clava Herculis
——————— ramiflorum
Kinkina, St. Domingo, Angustura Bark ?

Many others, not having flowered in the garden, cannot be ascertained.

ALEXANDER ANDERSON,
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CIII. A Balance Level for laying out Land, by Mr. Richard Drew. See page 22.

CIV. An artificial Mother for rearing Poultry, by Mrs. D'Oyley. See page 24.

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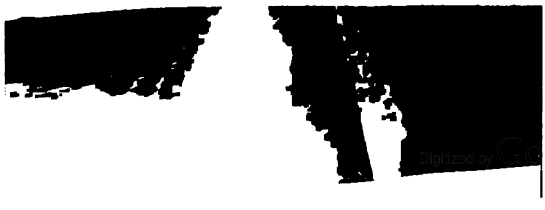
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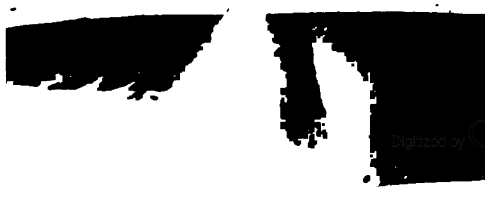

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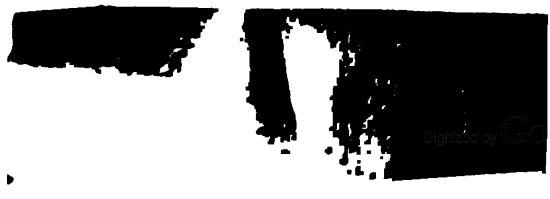
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Wood, Mr. William, *Richmond Buildings*
Woodburn, Mr. John, *St. Martin's Lane*
Woodburn, Mr. Wm. *Ditto*
† Woodfall, Mr. George, *Paternoster-row*
P Wodhull, Michael, Esq. *Shenford, Northampton*
Woodthorpe, Thomas, W. H. Esq. *Guildhall*
Woolf, Mr. Arthur, *Wood-street, Spa-fields*
Woolfe, J. R. Esq.
Worrall, Jonathan, Esq. *Micklam, near Dorking, Surry, or, at Mr. John Bond's, St. Mary Axe*
P Wotton, William Samuel, Esq.
Wrather, Mr. Roycroft, *Charing-cross, and* 36, *Francis-street, Newington-Butts*
P Wright, Charles, Esq. *Old Jewry*

Wright,

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Wright, J. Esq. *Market-Drayton, Shropshire*
Wright, Mr. Robert, *5, New North-street*
††Wyndham, Thomas, Esq. M. P.

Y

P Young, Arthur, Esq. F. R. S. &c. *Board of Agriculture, in Sackville-Street*
Young, William, jun. Esq. *2, James-street, Adelphi*

Z

P Zenobio, Right Honourable Count Alvise

Where Errors have arisen in printing the Names or Residence of the Noblemen and Gentlemen in the above List, or where any Alterations are wished for, a note upon the Subject, addressed to the Collector, at the Society's House, in the Adelphi, will be attended to.

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LIST OF THE CORRESPONDING MEMBERS OF THE SOCIETY.

Barbadoes, the Society for promoting Arts and Commerce, at
Caldwell, Sir James, Bart. *Castle Caldwell, Ireland*
Rogerson, Dr. John, *St. Petersburgh*
Rush, Dr. Benjamin, *Philadelphia*
Dancer, Thomas, M. D. *Superintendent of the Botanic Garden, Jamaica*
Titford, Isaac, M.D. *Spanish Town, Jamaica*
Chevalier De Souza, *Portugal*
Guthrie, Dr. Matthew, *Physician to the Imperial Corps of Cadets, at St. Petersburgh*
Baron Itzenplitz, *Counsellor of the Chamber of the Electoral Domains of the King of Prussia, and Knight of the Order of St. John, at Berlin*
Anderson, Dr. James, *Physician-General, Madras*
Webb, John, Esq. *Member of the Board of Trade, Bengal*
Roxburgh, Dr. William, *Calcutta*
Anderson, Alexander, M.D. F.R.S. Ed. *Superintendent of the Botanic Garden in the Island of St. Vincent*
Hynam, Mr. Robert, *St. Petersburgh*
Berezy, William, Esq. *of York and Berezy, in Upper Canada*
Vondenvelden, William, Esq. *Quebec*
Edelcrantz, the Chevalier, A.N. *Sweden*
Vitoftoff, his Excellency Mr. Alex. *Petersburgh*
Deriabin, Mr. Andrew, *ditto*
Titford, William Jowett, Esq. *Spanish Town, Jamaica*
Mac Rea, Alexander, Esq. *Demarara*
La Terriere, M.D. *Quebec*

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Place the Engravings so that the Names of the Inventors may either be upright or on the outside Margin of the Page, and take care to place the Impressions far enough within the Volume, that their exterior Edges may not be damaged, when they are subsequently cut.

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89, Chancery-lane.

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CHARLES DUKE OF RICHMOND,

K.G. F.R.&A.S.

late a Vice President of the Society for the Encouragement of Arts, Manufactures and Commerce

Drawn and Engraved by Wm Evans from an original Picture by Romney in the Possession of the present Duke of Richmond

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TRANSACTIONS

OF THE

SOCIETY,

INSTITUTED AT LONDON,

FOR THE

ENCOURAGEMENT

OF

ARTS, MANUFACTURES, AND COMMERCE;

WITH THE

PREMIUMS offered in the Year 1807,

AND

AN ANALYTICAL INDEX

TO THEIR

FIRST TWENTY-FIVE VOLUMES.

VOL. XXVI.

LONDON:

PRINTED BY R. WILKS, CHANCERY-LANE.

Sold by the HOUSEKEEPER, at the SOCIETY'S HOUSE, in the ADELPHI; and by Messrs. ROBSON, J. WHITE, BECKET, JOHNSON, CADELL and DAVIES, PHILLIPS, WALTER, RICHARDSON, LONGMAN and REES, TAYLOR, and WYATT.

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PREFACE.

AS a Tribute of Respect to the Memory of his Grace the late Charles Duke of RICHMOND, K. G. F. R. and A. S. who was elected a Member of the Society in the year 1758, chosen a Vice-President in 1763, and who, for nearly fifty years, contributed to extend the sphere of its utility, by an annual Subscription of five Guineas, the Society instituted for the Encouragement of Arts, Manufactures, and Commerce, have embellished the present Volume with his Portrait, (drawn and engraved with the permission of his noble Successor,) by Mr. Evans, from a Painting executed by Romney.

A period of about fifty-four years has now elapsed since this Society first begun and since continued their attentions, to the various objects of the institution; and they trust that their present Volume will be found to contain much valuable information in the several departments under which their business is usually classed.

Under the Class of Agriculture, the Right Hon. the Earl of Mansfield will be found to have promoted the public

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interest, by Planting 96,000 Oak Trees, which may contribute, at a future period, to the service of the Royal Navy, that Bulwark of the British Empire.

The Right Rev. the Lord Bishop of Llandaff, well known for his excellent chemical publications, has lately devoted some part of his leisure to the Planting of 322,500 Larch Trees, which afford useful, valuable, and durable timber.

The Right Hon. Lord Boringdon, by Embankments from the Sea, has gained two hundred and fifteen Acres of Land, which are already become valuable and productive.

Upon a similar plan, William Lawrence, Esq. of Maldon, in Essex, has gained a considerable Tract of Land, and has thus contributed much to the salubrity of that neighbourhood, by removing the morasses and stagnant pools of water which generally occasion the intermittent fevers prevalent in such situations.

The extensive Plantations of Fruit Trees, made at Hefleton, near Wareham, in Dorsetshire, by Dr. Baine, are planned and managed with great judgment. They are well deserving of inspection by all persons who have an opportunity of encouraging this branch of agriculture. They present to the eye great varieties of delightful scenery, highly interesting in every stage of their growth, and such as naturally

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turally tend to excite a stimulus
exertions; they also prove the
derable profit soon arising from

To Mr. Charles Waistell, of
are much indebted, for a very
of Methods to ascertain the V
Trees, at different periods, with
on the Means of promoting their
their Value, derived from his acti
attention; and it is probable that
will be generally referred to, as t
kind hitherto made known.

Much light has been thrown on
tion, by the very ingenious and e
John Christian Curwen, Esq. of
Cumberland; it seems evident fro
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is useful not only in allowing the ro
within the soil thus loosened, (a
and hitherto regarded as the only
ment in growth,) but also acts in a
noticed, namely, by promoting in
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action of the sun and air, and cre
plants, which absorbed by their le

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high degree luxuriant and productive. He has so far extended his observations on this subject as to show, that the mode of depositing the manure for plants, may be made subservient to this principle, that equally good crops may be produced with a less quantity of it, and the land preserved in better tilth and condition, than the same land would be with a greater quantity of manure, managed by the common practice.

Robert Burrows, Esq. of Great Witchingham, in Norfolk, has been engaged in a very accurate and extensive course of Experiments respecting the Comparative Advantages of Wheat, as sown broadcast, drilled, or dibbled; he has minutely described every operation, and accurately stated the expence of each of these modes of culture, the nature of the soil, condition of the land, produce of the corn, and the quantity of the straw; he has drawn inferences from the products, of the advantages or disadvantages attending each mode of culture.

The Improvement of Waste and Uncultivated Land, by J. Butler, Esq. of Bramshott, in Hampshire, shows an extraordinary increase of value from his judicious management, he having, at a moderate expence, since the year 1804, rendered sixty-six acres of land, then worth only sixteen pounds seven shillings and sixpence per annum, now

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Mason, of Goodrest-Lodge, near Warwick, has, instead of a knife, for this latter operation, successfully employed an instrument resembling that used by surgeons in tapping for the dropsy, known by the name of Trochar and Canula.

The usual mode of Churning Cream, to make Butter, is well known to be a laborious operation, but this labour is likely to be now considerably reduced, and the business facilitated, by the simple and ingenious invention of Mr. Thomas Fisher, of Ormskirk: the Head of his Churn-Staff has a rotatory motion upon a pivot at the bottom of the Staff, which completes the work sooner, and with more ease.

The Stall Feeding of Cattle, with a view to ascertain what breeds arrive at the earliest maturity, and have the greatest propensity to fatten, has been considered an object deserving much attention, and has induced the Society to offer two premiums for experiments in this line.

Under the Class of Chemistry, Mr. William Anderson, of his Majesty's Dock-Yard, at Portsmouth, has been rewarded for Improvements in Painting Canvas for Hammock Cloths, and other articles necessary to be guarded from Wet. His process comprizes the advantages of being cheap, soon executed, rendering the canvas pliant, durable,

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ble, and longer impervious t
adopted. He has also furni
on converting the colours
to use.

The benefits arising from p
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purpose.

In the Class of Polite Arts,
be seen, from the various R
Society have given great enc
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taste of those who may in futu
arts, and to excite a laudable s
young professional artists. The
respectable company who atte
of the Rewards of the Society, l

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heart-felt pleasure derived from contemplating the exertions of rising merit.

In the Class of Manufactures, the Society furnish one instance among many which this united empire affords, of the spirit with which its inhabitants meet the difficulties attempted to be thrown in their way by foreign powers. By the ports of the continent being closed against us, it was expected that our manufactures would be destroyed for want of raw materials on one hand, and for want of sales for our goods on the other. Our enemies had even contemplated, with pleasure, the distress which they expected to arise to our Navy from want of hemp for cables, ropes, and sail-cloth. At this juncture it has been shown, by the experiments of Mr. George Whitworth, of Cuxwold, that fifteen thousand tons of sheeps' wool may be annually advantageously devoted to the manufacture of articles heretofore usually made of hemp; thus furnishing employment to our manufacturers, encouraging and rewarding the farmers, increasing their attention to this article, and allowing the hemp necessarily imported to be exclusively devoted to the service of our Navy.

The ingenuity of our manufacturers in facilitating the detail of their business, is frequently displayed by improvements. The ingenious Implement lately invented by Mr. Peter Tansley, for cutting Shag Edgings, is simple in

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in construction, and affords gr
work.

Under the class of Mecha
veries are made known to the
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its security, comfort, and succes
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ginal masts have been broken by
shows, that from the spare spa
King's ships, and in every mer
equipped, Jury-masts may be con
much sail as on the usual mast
ships to prosecute their voyage
delay.

The improvement in anchors
them more durable, and less liab
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security to a ship. His double
anchor effects that business wit
usual risk:

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The great scarcity of Oak timber for the Navy, is become a serious object of consideration, and every means for providing a substitute for its use is of much consequence. Mr. Roberts's invention of securing the ends of the beams of ships, by iron work instead of wooden knees, will be a saving in expence of three hundred pounds in the construction of every seventy-four gun ship. He has not only been rewarded by this Society, but after a series of trials this plan has been patronized by his Majesty and the Navy Board.

Telegraphic communication has been found of great use in this kingdom, and every means of facilitating correspondence upon this principle deserves attention. The inventions of Major Charles Le Hardy, of the Chevalier Edelcrantz, and of Mr. Henry Ward, all detailed in the present volume, show great ingenuity in effecting or assisting such communication.

In making inclosures of land great expence frequently arises from raising and removing large stones, partly exposed to view, and partly buried under ground; the easy and simple mode by which Mr. Robert Richardson has effected this business, shows that things may actually be sometimes completely executed in a manner difficult to be accounted for theoretically.

Few

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Few persons have escaped the unpleasant sensation of being exposed to the inconvenience of a great current of air between the bottom of a door and a fire-place. Mr. John Tadd's invention will obviate this evil, and allow the door to pass with ease over the floor carpet.

Various means have been attempted by Mechanics to make an universal Screw-Wrench, or an Instrument which could be fitted to the different sized Heads of Screws. The Implement invented for this purpose, by Mr. William Barlow, will be found ingenious, simple, and efficacious.

Few subjects have lately been more the topic of conversation, and of speculation, than the effects of Carbonated Hydrogen Gas, in lighting rooms, factories, or places of public resort. The communication produced to the Society by Mr. Clegg on this matter, will furnish to the public the means of executing plans of this kind, according to modes long established by him, and accurately described in the present volume.

The Society, ever alive to the calls of humanity, have rewarded Captain Manby, for his Improvement for forming a Connection with a Ship stranded, by means of a Rope thrown over the Vessel, from a Mortar on the Shore. From the Engravings and detailed Experiments given

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given in the volume, the method is fully shown, and that it is likely to be the means of saving many a brave seaman from a watery grave. The public will no doubt unite in sentiment with the noble President of the Society, who declared, on presenting him with the Gold Medal, that he had great pleasure in observing, that the means which had heretofore been usually employed for the destruction of mankind, were now likely to be advantageously used by Captain Manby for their preservation.

The public will find, under the Class of Colonies and Trade, that attention has been paid to the Encouragement of the British Herring Fisheries, and from the opinions of persons conversant in the business, that the herrings cured by Mr. Errington, of Yarmouth, approach nearer in goodness to those of the Dutch, than any of the British cured white pickled herrings.

The Royal Botanical Garden of St. Vincent will be found to flourish under the superintendency and care of Dr. Alexander Anderson, who appears indefatigable in pursuit of the objects of that establishment. We greatly lament with him, that owing to difficulties at the Custom-house, many valuable Articles of Natural History are frequently lost or injured, and the kingdom deprived of products which would eventually improve its manufactures, and extend its commerce.

The

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The Communications from Dr. William Roxburgh, of Calcutta, show his accustomed zeal for promoting the interests of his native country, and the great resources to which it can have recourse, without resorting for assistance to other powers; it is a circumstance highly gratifying, to find that Canvas of very good quality for ship sails, can be furnished advantageously for the Navy, from our East India settlements, and that Hemp produced there, is reckoned equal, if not superior, to Russian Hemp.

A perusal of the present Volume will convince the public, that the Society have paid great attention during their Session, to general Improvements in the Arts, Manufactures, and Commerce of the British Empire, for the promotion of which they were established, and they trust their labours will meet with general approbation.

The Meetings of the present Session commenced in October last, and are numerously attended; the business is conducted with their usual alacrity; and the Society are ever ready to patronise, not only the immediate objects of the Premiums they have offered, but are disposed to extend it to every other invention consistent with the plan of the institution.

The Society take the present opportunity of expressing their thanks to the several Public Bodies and individuals from

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from whom they have received the sundry presents noted in this volume, and are particularly obliged to Alexander Mitchell, Esq. for the valuable additions to their library, with which he has favoured them from time to time, and hope that his example will be followed by other Members of the Society, and the Friends of this Establishment.

The Society desire it to be clearly understood, that as a body they are not responsible for any opinion or representation of facts contained in the following pages. They have endeavoured only to compress, into a form more concise, such communications as appeared to them too diffuse when received.

A great increase in the number of Members hath taken place during the last Session, and the Finances of the Society are in a very flourishing state. There is probably no other Institution in the world where the Members have such opportunities of acquiring useful knowledge, and enjoying such patronage and privileges. To every improvement or invention by which the happiness of mankind can be promoted, the Views of the Society are extended, and their Bounties and Rewards reach the remotest climates,

Adelphi, London,
Dec. 30, 1808.

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PREMIUMS offered i
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Charles, Duke of

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Thomas Pitt, Esq.
Caleb Whitefoord,
Richard Clark, Esq
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Richard Powell, M.
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ADVERTISEMENT TO THE PUBLIC.

THE chief objects of the SOCIETY are to promote the Arts, Manufactures, and Commerce of this Kingdom, by giving honorary or pecuniary Rewards, as seem to them best adapted to the case, for all such useful Inventions, Discoveries, and Improvements, (though not mentioned in this book) as tend to that purpose; and, in pursuance of this plan, the Society have already expended many THOUSAND POUNDS, advanced by voluntary subscriptions of their members, and legacies bequeathed.

The Register of the Premiums and Bounties they have given, which may be seen at the SOCIETY's house in the *Adelphi*, will show the very great advantages which the Public have derived from this Institution.

The meetings of the SOCIETY are held every *Wednesday*, at seven o'clock in the evening, from the fourth *Wednesday* in *October* to the first *Wednesday* in *June*. The several Committees meet on other evenings in the week during the session, as particularly mentioned in their printed book of Rules and Orders.

In order still farther to promote the laudable Views of the SOCIETY, it may be necessary to explain the mode by which members are elected.

Each member has the privilege, at the meetings of the SOCIETY, or by letter to the Secretary, to propose any person who is desirous to become a member, provided the proposal contains the name, with the full addition, and place of abode, of the proposed member, and is signed by three members of the SOCIETY.

Peers of the Realm or Lords of Parliament are, on their being proposed, immediately ballotted for; the names of other persons proposed to become members are to be delivered to the Secretary, read at the next meeting of the SOCIETY, and then inserted in lists which are hung up in the Society's room: they are ballotted for at the second following ordinary meeting. In both cases, if two-thirds of the members then voting ballot in their favour, they are deemed perpetual members upon payment of not less than Twenty Guineas in one sum, or subscribing members upon payment of any sum not less than Two Guineas annually.

All members are entitled to vote and assist in all the business of the SOCIETY, and the several Committees. The members have also the privilege of recommending two persons as auditors at the meetings of the SOCIETY, and by addressing a note to the housekeeper, of introducing their friends to examine the various Models, Machines, and Productions, in different branches of Arts, Manufactures, and Commerce, for which rewards have been bestowed; also to inspect the magnificent series of moral and historical Paintings, executed by the late J. BARRY, Esq. which, with some valuable Busts, Statues, &c. decorate the Great Room.

Members have the use of the Society's Library, which is valuable and annually increasing, from donations of scientific and useful books and engravings. The SOCIETY are highly sensible of the great importance of such acquisitions, and are happy to record them, with the names of the donors, in the Volume annually published of the SOCIETY's Transactions, to which the members are entitled.

Ladies are eligible as members of the SOCIETY, to all the Privileges thereof, and are alone entitled to vote by proxy at elections, through the medium of any gentleman who is a member, on his producing a written authority for the same.

The time appointed for admission to the Paintings or Models, is from ten to two o'clock, Sundays and Wednesdays excepted.

ORDERED, SOCIETY'S HOUSE, ADELPHI, JUNE 1st, 1808.

That the several Candidates and Claimants, to whom the Society shall adjudge Premiums or Bounties, do attend at the Society's House, in the Adelphi, on the last Tuesday, in May, 1809, *at Eleven o'Clock in the Morning precisely, to receive the same; that Day being appointed by the Society for the Distribution of their Rewards: And before that time no Premium or Bounty will be delivered, excepting to those who are about to leave the Kingdom.*

In cases where the Society may think fit to admit excuses for not attending in person, Deputies may be substituted to receive the Rewards, provided such Deputies are either Members of the Society, or superior Officers thereof.

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PREMIUMS IN AGRICULTURE.

Article 1. ACORNS.

FOR having set between the first of October, 1806, and the first of April, 1807, the greatest quantity of land, not less than ten acres, with acorns, with or without seeds, cuttings, or plants of other trees, at the option of the candidate; and for effectually fencing and preserving the same, in order to raise timber; the gold medal.

2. For the second greatest quantity of land, not less than five acres, set agreeably to the above conditions; the silver medal.

Certificates of setting agreeably to the above conditions, and that there are not fewer than three hundred young oaks on each acre, to be delivered to the Society on or before the first Tuesday in December, 1808.

3. RAISING OAKS. To the person who shall have raised, since the year 1804, the greatest number of oaks, not fewer than five thousand, either from young plants or acorns, in order to secure a succession of oak timber in this kingdom; the gold medal.

4. For the next greatest number, not fewer than three thousand; the silver medal.

Certificates that there were on the land, at least the number of young oak-trees required, in a thriving condition, two years after the planting, with an account of the methods pursued in making and managing the plantation, to be produced to the society on or before the first Tuesday in January, 1809.

5. ASCERTAINING THE BEST METHOD OF RAISING OAKS. To the person who shall ascertain in the best manner, by actual experiments, the comparative merits of the different modes of raising oaks for timber, either from acorns set on land properly dug or tilled, from acorns set by the spade or dibble, without digging or tillage, either on a smooth surface, or among bushes, fern, or other cover; or from young plants previously raised in nurseries, and transplanted; regard being had to the expense, growth, and other respective advantages of the several methods; the gold medal.

The *accounts*, and proper *certificates*, that not less than one acre has been cultivated in each mode, to be produced to the Society on or before the first Tuesday in November, 1808.

6. CHESNUTS. For having sown or set, between the first of October, 1806, and the first of April, 1807, the greatest quantity of land, not less than six acres, with Spanish chesnuts, with or without seeds, cuttings, or plants of other trees, adapted to such soil, at the option of the candidate; and for effectually fencing and preserving the same, in order to raise timber; the gold medal.

7. For the second greater quantity, not less than four acres; the silver medal.

Certificates of sowing or setting, agreeably to the above conditions, and that there are not fewer than three hundred chesnut plants in a thriving state, on each acre, to be delivered to the Society on or before the first Tuesday in January, 1809.

8. ELM. For having planted the greatest number of the English elm, not less than eight thousand, between the twenty-fourth of June, 1806, and the twenty-fourth of June, 1807; and for having effectually fenced and preserved the same in order to raise timber; the gold medal.

9. For the second greatest number, not less than five thousand; the silver medal.

Certificates of having planted agreeably to the above conditions, that the plants were in a healthy and thriving state two years at least after making the plantation, and specifying the distance of the plants, to be delivered to the Society on or before the first Tuesday in April, 1809.

10. LARCH. For having planted out, between the twenty-fourth of June, 1805, and the twenty-fourth of June, 1806, the greatest number of larch-trees, not fewer than five thousand, and for having effectually fenced and preserved the same in order to raise timber; the gold medal.

11. For the next greatest number, not fewer than three thousand; the silver medal.

Certificates of the number of plants, that they were in a healthy and thriving state two years at least after they were planted out, with a general account of the methods used in making the plantation, to be delivered to the Society on or before the last Tuesday in December, 1808.

N. B. The larch-trees may be planted, either mixed with other trees, or by themselves, as may best suit the convenience of the planter.

12. ASH. For having sown or set, in the year 1805, the greatest quantity of land, not less than six acres, with ash for timber, with or without seed, cuttings, or plants, of such other trees as are adapted to the soil; the gold medal.

13. For the next greatest quantity, not less than four acres; the silver medal.

Certificates of the sowing or setting, agreeably to the above conditions, that there are not fewer than six hundred ash plants on each acre, in a thriving and healthy condition, two years at least after the sowing or setting, with a general account of the methods used in making the plantation; to be delivered to the Society on or before the last Tuesday in December, 1808.

N. B. It is the intention of the Society, that such lands only as are not calculated for the purposes of Husbandry, should be employed for the purposes specified in these advertisements.

14. FOREST-TREES. To the person who shall have enclosed and planted, or set, the greatest number of acres (not less than ten) of land, that is incapable of being ploughed, such as the borders of rivers, the sides of precipices, and any land that has too many rocks, or that is not calculated to repay the expense of tillage, owing to the surface be-

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ing too hilly, mountainous, or otherwise unfit for tillage, with the best sorts of forest-trees, namely, oak, Spanish chesnuts, ash, elm, beech, alder, willow, larch, spruce, and silver fir, with or without screens of Scotch fir, adapted to the soil, and intended for timber-trees, between the first of October, 1805, and the first of April, 1806; the gold medal.

15. For the second greatest quantity of land, not less than seven acres; the silver medal.

A particular *account* of the methods used in making and managing the plantations, the nature of the soil, the probable number of each sort of plants, together with proper *certificates* that they were in a healthy and thriving state two years at least after making the plantation, to be delivered to the Society on or before the first Tuesday in December, 1808.

N. B. With the above forest-trees, the seeds, cuttings, or plants, of such other trees as are adapted to the soil, and proper for underwood, may or may not be intermixed.

The candidates for planting all kinds of trees are to produce certificates that the respective plantations are properly fenced and secured, and particularly to state the condition of the plants at the time of signing such certificates. Any information which the candidates for the foregoing premiums may choose to communicate, relative to the methods made use of in forming the plantations, or promoting the growth of the several trees, or any other observations that may have occurred on the subject, will be thankfully received.

16. SECURING PLANTATIONS OF TIMBER-TREES, AND HEDGE-ROWS. To the person who shall give to the Society the most satisfactory account, founded on experience, of the most effectual and least expensive method of securing young plantations of timber-trees, and hedge-rows, from hares and rabbits, as well as sheep and larger cattle, which at the same time shall be least subject to the depredations of wood-stealers; the silver medal.

The *accounts*, and *certificates* of the efficacy of the method, to be produced to the Society on or before the first Tuesday in December, 1808.

17. COMPARATIVE CULTURE OF WHEAT, BROAD-CAST, DRILLED, AND DIBBLED. For the best set of experiments, made on not less than twelve acres, four of which to be sown broad-cast, four drilled, and four dibbled, the two latter in equidistant rows, in order fully to ascertain which is the most advantageous mode of cultivating wheat; the gold medal.

It is required that every operation and expense of each mode of culture be fully described: and that proper *certificates* of the nature and condition of the land on which the experiments were made, together with an *account* of the produce of the corn, the weight per bushel, and also of the straw, be produced to the Society on or before the first Tuesday in February, 1809.

18. BEANS AND WHEAT. To the person who shall have dibbled or drilled between the first of December, 1807, and the 1st of April, 1808, the greatest quantity of land, not less than ten acres, with beans, in equidistant rows, and hoed the intervals twice or oftener, and shall have sown the same land with wheat in the autumn of the year 1808; the gold medal.

It is required that an *account* of the sort and quantity of beans, the time of dibbling or drilling, and of reaping or mowing them, the produce per acre thrashed, the expense of dibbling or drilling, hand or horse hoeing, the distance of the rows, and the quality of the soil, together with *certificates* of the number of acres, and that the land was afterwards actually sown with wheat, be produced on or before the second Tuesday in March, 1809.

19. BEANS. To the person who, in the year 1806, shall discover and cultivate, either by the drill or dibbling method, on not less than five acres, a species of horse-beans or tick-beans, that will ripen their seeds before the 21st of August; the silver medal.

It is required that a particular account of the bean, the cultivation, and the expense attending it, with proper *certificates* of the nature and condition of the land on which the experiments were made, together with an *account* of the produce, the weight per Winchester bushel, and a sample of not less than a peck, be produced to the Society on or before the first Tuesday in December, 1808. It is apprehended that if a bean should be brought into cultivation with the habits of the hotspur, or other early peas, that it would in a great measure escape the danger arising from the collier-insect, or other insects, and allow more time for the farmers to till the land for the subsequent crop of wheat. The *accounts* and *certificates* to be delivered on or before the first Tuesday in December, 1808.

20. PARSNIPS. To the person who in the year 1808, shall cultivate the greatest quantity of land, not less than five acres, with parsnips, for the sole purpose of feeding cattle or sheep; the gold medal.

Certificates of the quantity of land so cultivated, with a particular *account* of the nature of the soil and weight of the produce on sixteen perches, and also of the condition of the cattle or sheep fed with the parsnips, and the advantages resulting from the practice, to be produced to the Society on or before the second Tuesday in February, 1809.

21. BUCK WHEAT. To the person who shall cultivate the greatest quantity of land with buck wheat, not less than thirty acres; the gold medal.

It is required that the time of sowing and reaping be noticed; also a particular *account* of the species, cultivation, and expense attending it, the manner of reaping it, thrashing it, and housing the grain; with proper

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certificates of the nature and condition of the land on which the experiments were made, and the name of the crop, if any, which the same land bore the preceding year, together with an *account* of the produce, and a sample of the seed, not less than a quart, be produced to the Society on or before the second Tuesday in January, 1809.

22. For the next greatest quantity, not less than fifteen acres, on similar conditions; the silver medal.

Information respecting its application to the feeding of cattle, hogs, and poultry, and other of its uses, is also desired. It is known to be particularly serviceable in furnishing honey to bees.

23. RAISING GRASS SEEDS. To the person who shall raise the greatest quantity of each of any of the following named grass seeds, *viz.*—Meadow fox-tail (alopecurus pratensis), sweet-scented vernal grass (anthoxanthum odoratum), Timothy grass (phleum pratense), meadow fescue grass (festuca pratensis), smooth-stalked meadow grass (poa pratensis), rough-stalked meadow grass (poa trivialis); the silver medal.

It is required that *certificates* from persons who have viewed them in a proper state, to identify that they are one or other of the seeds above mentioned, indicating clearly the particular species, and noticing the quantity produced of such seeds, free from weeds or mixture of other grasses, together with proper samples of the seeds, be produced to the Society on or before the first day of February, 1809.

24. PRESERVING TURNIPS. To the person who shall discover to the Society the best and cheapest method of preserving turnips perfectly sound, and in every respect fit for the purpose of supporting and fattening sheep and neat cattle during the months of February, March, and April; the gold medal.

It is required that a full and accurate *account* of the method employed, and the expense attending the process, together with *certificates* that the produce of four acres at the least have been preserved according to the method described, and applied to the feeding of sheep and neat cattle; that the whole were drawn out of the ground before the first day of February, in order to clear the greater part of it previous to its being prepared for corn, and to save the soil from being exhausted by the turnips; and also of the weight of an average sixteen perches of the crop; be produced to the Society on or before the first Tuesday in December, 1808.

25. For the next in quantity and merit, on not less than two acres; the silver medal.

26. PRESERVING CABBAGES. To the person who shall discover to the Society the best and cheapest method of preserving drum-headed cabbages perfectly sound, and in every respect fit for the purpose of supporting and fattening sheep and neat cattle during the months of February, March, and April; the gold medal.

27. For the next in quantity and merit, on not less than two acres; the silver medal.

Conditions the same as for preserving turnips, Art. 24. And the *accounts* to be produced on or before the first Tuesday in December, 1808.

28. PRESERVING CARROTS, PARSNIPS, OR BEETS. To the person who shall discover to the Society the best and cheapest method of preserving carrots, parsnips, or beets, perfectly sound, and in every respect fit for the purpose of supporting horses, and fattening sheep and neat cattle, during the months of February, March, and April; the gold medal.

Conditions the same as for preserving turnips, Art. 24. And the *accounts* to be delivered in on or before the first Tuesday in December, 1808.

29. For the next in quantity and merit, on not less than two acres; the silver medal.

30. PRESERVING POTATOES. To the person who shall discover to the Society the best and cheapest method of preserving potatoes, two or more years, perfectly sound, without vegetating, and in every other respect fit for the purpose of sets and the use of the table, and consequently of supporting and fattening cattle; the gold medal, or thirty guineas.

It is required that a full and accurate *account* of the method employed, and the expense attending the process, with *certificates* that one hundred bushels at the least have been preserved according to the method described, and that one or more bushels of the same potatoes have been set, and produced a crop without any apparent diminution of their vegetative power, and also that they have been used at table, with entire satisfaction to the person who eat of them, together with a sample of one bushel, be sent to the Society on or before the first Tuesday in December, 1808.

31. For the next greatest quantity, not less than fifty bushels; the silver medal.

32. MAKING MEADOW-HAY IN WET WEATHER. To the person who shall discover to the Society the best and cheapest method, superior to any hitherto practised, of making meadow-hay in wet weather; the gold medal.

A full *account* of the method employed, and of the expense attending the process, with not less than fifty-six pounds of the hay; and *certificates* that at least the produce of six acres of land has been made according to the method described, and that the whole is of equal quality with the sample; to be produced on or before the first Tuesday in January, 1808.

33. HARVESTING CORN IN WET WEATHER. To the person who shall discover to the Society the best and cheapest method, superior to any hitherto practised, of harvesting corn in wet weather; the gold medal.

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A full *account* of the method employed, and of the expense attending the process, with not less than two sheaves of the corn, and *certificates* that at least the produce of ten acres has been harvested according to the method described, and that the whole is of equal quality with the samples, to be produced on or before the first Tuesday in January, 1809.

34. GAINING LAND FROM THE SEA. To the person who shall produce to the Society an account, verified by actual experiment, of his having gained the greatest quantity of land from the sea, not less than fifty acres, on the coast of Great Britain or Ireland; the gold medal.

Certificates of the quantity of land, and that the experiments were begun after the first of January, 1802, to be produced to the Society on or before the last Tuesday in November, 1808.

35. The same premium is extended one year farther.

Certificates to be produced on or before the last Tuesday in November, 1809.

36. IMPROVING LAND LYING WASTE. For the most satisfactory *account* of the best method of improving any of the following soils, being land lying waste or uncultivated, *viz.* clay, gravel, sand, chalk, peat-earth, and bog, verified by experiments on not less than fifty acres of land; the gold medal.

37. For the next greatest quantity, not less than thirty acres; the silver medal.

It is required, that the land, before such improvement, be absolutely uncultivated, and in a great measure useless, and that, in its improved state, it be enclosed, cultivated, and divided into closes.

Certificates of the number of acres, of the quality of the land so improved, with a full *account* of every operation and expense attending such improvement, the state it is in as to the proportion of grass to arable, and the average value thereof, to be produced on or before the first Tuesday in February, 1809.

38. MANURES. For the most satisfactory set of experiments, to ascertain the comparative advantages of the following manures, used as top-dressings on grass and corn land, *viz.* soot, coal-ashes, wood-ashes, lime, gypsum, night-soil, or any other fit article; the gold medal. It is required that the above experiments be made between two or more of the above-mentioned manures, and that no less than two acres of land be dressed with each manure.

An *account* of the nature of the soil, quantity, and expense of the manure and crops, with *certificates*, to be produced on or before the last Tuesday in February, 1809.

39. RAISING WATER FOR THE IRRIGATION OF LAND. To the person who shall discover to the Society the cheapest and most effectual method of raising water in quantities sufficient to be beneficially employed for the purpose of irrigating land, superior to, and cheaper than any other method now in use; the gold medal, or fifty guineas.

A model, on a scale of one inch to a foot, with *certificates* that a machine at large, on the same construction, has been used, specifying the quantity of water delivered in gallons per hour, and the height to which it was raised, to be produced to the Society on or before the first of March, 1809.

40. PARING PLOUGH. To the person who shall invent and produce to the Society a machine or plough for the purpose of paring land preparatory to burning, superior to any hitherto known, or in use for such purpose, and to be worked by not more than one man and two horses; the silver medal, or twenty guineas.

The machine, and *certificates* that at least three acres have been pared by it in a proper manner, to be produced to the Society on or before the first of January, 1809.

41. MACHINE FOR DIBBLING WHEAT. To the person who shall invent a machine, superior to any hitherto known or in use, to answer the purpose of dibbling wheat, by which the holes for receiving the grain may be made at equal distances and proper depths; the silver medal and ten guineas.

The *machine*, with *certificates* that at least three acres have been dibbled by it, to be produced to the Society on or before the second Tuesday in January, 1809.

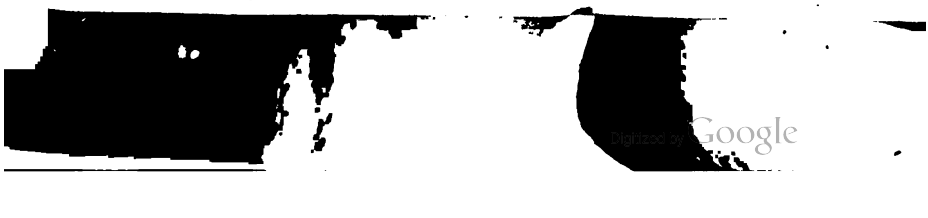
42. MACHINE FOR REAPING OR MOWING CORN. For inventing a machine to answer the purpose of mowing or reaping wheat, rye, barley, oats, or beans, by which it may be done more expeditiously and cheaper than by any method now practised, provided it does not shed the corn or pulse more than the methods in common practice, and that it lays the straw in such a manner that it may be easily gathered up for binding; the gold medal.

The *machine*, with *certificates* that at least three acres have been cut by it, to be produced to the Society on or before the second Tuesday in December, 1808. Simplicity and cheapness in the construction of this and the preceding machine, will be considered as principal parts of their merit.

43. THRASHING MACHINE. To the person who shall invent a machine by which corn of all sorts may be thrashed more expeditiously, effectually, and at a less expense, than by any method now in use; the gold medal.

The *machine*, or a model, with proper *certificates* that such a machine has been usefully applied, that at least thirty quarters have been thrashed by it, and of the time employed in the operation, to be produced to the Society on or before the last Tuesday in February, 1809.

44. DESTROYING THE GRUB OF THE COCKCHAFER. To the person who shall dis-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cover to the Society an effectual method, verified by repeated and satisfactory trials, of destroying the grub of the cockchafer, or of preventing or checking the destructive effects which always attend corn, peas, beans, and turnips, when attacked by those insects; the gold medal.

The *accounts*, with proper *certificates*, to be produced on or before the first Tuesday in January, 1809.

45. DESTROYING WORMS. To the person who shall discover to the Society an effectual method, verified by repeated and satisfactory trials, of destroying worms, or of preventing the destrucive effects they occasion on corn, beans, pease, or other pulse; the silver medal.

The *accounts*, with proper *certificates*, to be produced to the Society on or before the first Tuesday in January, 1809.

46. DESTROYING THE FLY ON HOPS. To the person who shall discover to the Society an easy and efficacious method of destroying the fly on hops, superior to any hitherto known or practised, on not less than four acres of hop ground; the gold medal.

Accounts and *certificates* to be delivered to the Society on or before the first Tuesday in February, 1809.

47. PREVENTING THE BLIGHT, OR RAVAGES OF INSECTS, ON FRUIT-TREES AND CULINARY PLANTS. To the person who shall discover to the Society the most effectual method of preventing the blight or ravages of insects on fruit-trees and culinary plants, superior to any hitherto known or practised, and verified by actual and comparative experiments; the silver medal.

The *accounts*, with proper *certificates*, to be delivered to the Society on or before the second Tuesday in December, 1808.

48. CURE OF THE ROT IN SHEEP. To the person who shall discover to the Society the best and most effectual method of curing the rot in sheep, verified by repeated and satisfactory experiments; the gold medal.

It is expected that the candidates furnish accurate *accounts* of the symptoms and cure of the disease, together with the imputed cause thereof, and the actual or probable means of prevention, which, with proper *certificates*, must be delivered to the Society on or before the first Tuesday in February, 1809.

49. CURE OF THE FOOT-ROT IN SHEEP. To the person who shall discover to the Society the best and most effectual method of curing the foot-rot in sheep; the silver medal.

It is required that the cure be ascertained by repeated and satisfactory experiments, and the method of performing it be verified by proper *certificates* delivered to the Society on or before the first Tuesday in February, 1809.

50. PREVENTING THE ILL EFFECTS OF FLIES ON SHEEP. To the person who shall discover to the Society the most effectual method of protecting sheep from being disturbed and injured by flies; the silver medal.

It is required, that the method be ascertained by repeated experiments, and that a *certificate* of its efficacy be delivered to the Society on or before the first Tuesday in December, 1808.

51. PROTECTING SHEEP. To the person who, in the year 1807, shall protect the greatest number of sheep, not fewer than one hundred, by hovels, sheds, or any other means, and give the most satisfactory account, verified by experiment, of the advantages arising from the practice of protecting sheep from the inclemency of the weather, by hovels, sheds, or any other means; the gold medal.

A particular *account* of the experiments made, with the advantages arising therefrom, together with the expense, and *certificates* of its utility, to be produced to the Society on or before the first Tuesday in March, 1808.

N. B. It is required that the *certificates* shall specify the length of time the sheep were so protected, and the manner in which they were maintained during that time; together with the general method of managing them.

52. CULTURE OF HEMP IN CERTAIN PARTS OF SCOTLAND. The Society wishing to encourage the growth of hemp for the use of the navy in certain parts of Scotland, comprehending the whole county of Argyle, that part of Perthshire, situated to the north of the river Tay, and west of the Military Road (see Ainsley's Map of Scotland) leading from Logierait to the county of Inverness, and such other parts of Scotland as lie north of Inverness-shire, offers to the person who shall sow with hemp, in drills at least eighteen inches asunder, the greatest quantity of land in the above-mentioned district, not less than fifty acres statute measure, in the year 1808, and shall at the proper season cause to be plucked the summer hemp, (or male hemp bearing no seed) and continue the winter hemp (or female hemp bearing seed) on the ground until the seed is ripe; the gold medal.

53. To the person who shall sow with hemp, in drills at least eighteen inches asunder, the next greatest quantity of land in the above-mentioned district, not less than twenty-five acres, statute measure, in the year 1808, and shall at the proper season cause the same to be plucked as above-mentioned; the silver medal.

Certificates of the number of acres, of the distance of the drills, of the plucking of the hemp, with a general *account* of the soil, cultivation, and produce, to be delivered to the Society, along with fourteen pounds of the hemp and two quarts of the seed, on or before the second Tuesday in January, 1809.

53. FEEDING OF CATTLE. For the best experiments on stall feeding of cattle (not less than five head) to be continued for the space of twelve months, in order to prove

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the earliest maturity and greatest propensity to fatten, of the most approved breeds of cattle in Great Britain, specifying the nature of the food given, together with the daily consumption of each beast, with its weekly increase in weight, and such other observations as may be deemed of consequence; the gold medal.

A full *account* of the methods employed, and of the expenses attending the same, and *certificates* of the sundry matters stated, to be produced on or before the second Tuesday in January, 1810.

PREMIUMS FOR DISCOVERIES AND IMPROVEMENTS IN CHEMISTRY, DYING, AND MINERALOGY.

54. PRESERVING SEEDS OF VEGETABLES. For the best method of preserving the Seeds of plants in a state fit for vegetation a longer time than has hitherto been practised, such method being superior to any known to the public, and verified by sufficient trial, to be communicated to the Society on or before the first Tuesday in December, 1808; the gold medal, or thirty guineas.

55. PREVENTING THE DRY-ROT IN TIMBER. To the person who shall discover to the Society the cause of the dry-rot in timber, and disclose a certain method of prevention superior to any hitherto known; the gold medal, or thirty guineas.

The *accounts* of the cause, and method of prevention, confirmed by repeated experiments, to be produced to the Society on or before the second Tuesday in Dec. 1808.

56. PRESERVING SALTED PROVISIONS FROM BECOMING RANCID OR RUSTY. To the person who shall discover to the Society the best, cheapest, and most efficacious method of preserving salted provisions from growing rancid or rusty; the gold medal, or thirty guineas.

A full *description* of the method, with proper *certificates* that it has been found, on repeated trials, to answer the purpose intended, to be produced to the Society on or before the first Tuesday in February, 1809.

57. REFINING WHALE OR SEAL OIL. For disclosing to the Society an effectual method of purifying whale or seal oil from the glutinous matter that incrusts the wicks of lamps, and extinguishes the light, though fully supplied with oil; the gold medal, or fifty guineas.

It is required that the whole of the process be fully and fairly disclosed, in order that satisfactory experiments may be made by the Society to determine the validity of the claim; and *certificates* that not less than twenty gallons have been purified according to the process delivered in, together with two gallons of the oil, in its unpurified state and two gallons so refined, to be produced to the Society, on or before the Second Tuesday in February, 1809.

58. MANUFACTURING TALLOW CANDLES. To the person who shall discover to the Society a method of hardening or otherwise preparing tallow, so that candles may be made of it which will burn as clear and with as small a wick as wax candles, without running, and may be afforded at a less expense than any at present made with spermaceti; the gold medal, or thirty guineas.

Certificates that 112lb. of such tallow have been made into candles, and 12lb. of the candles made thereof, to be produced to the Society on or before the second Tuesday in January, 1809.

59. CANDLES FROM RESIN OR OTHER SUBSTANCES. To the person who shall discover to the Society the best method of making candles of resin, or any other substance, fit for common use, at a price much inferior to those made of tallow only; the gold medal, or thirty guineas.

Six pounds at least of the candles so prepared, with an *account* of the process, to be delivered to the Society on or before the first Tuesday in December, 1808.

60. METHOD OF SEPARATING SUGAR IN A SOLID FORM FROM TREACLE. To the person who shall discover to the Society the best method of separating sugar from treacle, in a solid form, at such an expense as will render it advantageous to the public; the gold medal, or fifty guineas.

A quantity of the sugar so prepared, in a solid form, not less than thirty pounds weight, with an *account* of the process, and *certificates* that not less than one hundred weight has been prepared, to be produced to the Society on or before the first Tuesday in February, 1809.

61. INCREASING STEAM. To the person who shall invent and discover to the Society a method, verified by actual experiments, of increasing the quantity or force of steam, in steam-engines with less fuel than has hitherto been employed, provided that in general the whole amount of the expenses in using steam-engines may be considerably lessened; the gold medal, or thirty guineas.

To be communicated to the Society on or before the first Tuesday in January, 1809.

62. SUBSTITUTE FOR TAR. To the person who shall invent and discover to the Society the best substitute for Stockholm tar, equal in all its properties to the best of that kind, and prepared from materials the produce of Great Britain; the gold medal, or one hundred guineas. A quantity of the substitute, not less than one hundred weight, with *certificates* that at least one ton has been manufactured, and that it can be afforded at a price not exceeding that of the best foreign tar, together with an *account* of the process, to be delivered to the Society on or before the first Tuesday in March, 1809.

63. PREPARATION OF TAN. To the person who shall prepare, in the most concentrated form, so as to be easily portable, and at a price applicable to the purposes of manufacturers, the largest quantity, not less

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than one hundred weight, of the principle called by the French *tannin*, which abounds in oak-bark and many other vegetable substances; the gold medal, or thirty guineas.

Certificates of the superior quality of the quantity so prepared, and a sample of not less than 28lb. to be produced to the Society on or before the last Tuesday in January, 1809.

64. INDELIBLE INK. To the person who shall discover to the Society a method of making a black ink proper for writing, superior to any at present known, indestructible by chemical applications, and not dearer than that which is now in common use; the silver medal, or fifteen guineas.

Certificates that not less than two gallons of such ink have been actually prepared, and found to possess the qualities above mentioned, with a full detail of the process of making it, and two quarts of the ink, to be delivered to the Society on or before the second Tuesday in January, 1809.

65. PREPARATION OF A RED STAIN FOR COTTON CLOTH. To the person who shall communicate to the Society the cheapest and most effectual method of printing or staining cotton cloths with a red colour, by an immediate application of the colouring matter to the cloth, equally beautiful and durable with the red colours now generally procured from decoctions of madder; the gold medal, or thirty guineas.

Certificates that the above process has been advantageously used on ten pieces of calico, each twenty-one yards or upwards in length; one piece of the calico so printed, a quart of the colour in a liquid state, and a full *account* of the preparation and application, to be produced to the Society on or before the second Tuesday in January, 1809.

66. PREPARATION OF A GREEN COLOUR FOR PAINTING COTTON CLOTH. To the person who shall communicate to the Society the best and cheapest method of printing with a full green colour on cotton cloth, by an immediate application of the colouring matter from a wooden block to the cloth, equally beautiful and durable as the colours now formed from the complicated process of the decoction of weld on alumine, and the solutions of indigo by earths or alkaline salts; the gold medal, or thirty guineas.

Certificates and conditions as for premium 65.

67. RENDERING MUSLIN LESS COMBUSTIBLE. To the person who shall discover to the Society a method of rendering muslin less combustible, to be effected by a cheaper and more effectual mode than any hitherto known; the silver medal.

Specimens of the muslin so prepared, with a full account of the process employed for the purpose, to be produced to the Society on or before the first Tuesday in February, 1809.

N. B. It is expected that the means employed should neither injure the quality, nor stain the muslin, nor damage any print or dye with which it may be coloured.

68. SUBSTANCE FOR THE BASIS OF PAINT. To the person who shall produce to the Society the best substitute, superior to any hitherto known, for the basis of paint, equally proper for the purpose as the white-lead now employed; such substitute not to be of a noxious quality, and to be afforded at a price not materially higher than that of white lead; the gold medal, or one hundred guineas.

A quantity of the substitute, not less than 50lb. weight, with an *account* of the process used in preparing it, and *certificates* that at least one hundred weight has been manufactured, to be produced to the Society on or before the first Tuesday in January, 1809.

69. RED PIGMENT. To the person who shall discover to the Society a full and satisfactory process for preparing a red pigment, fit for use in oil or water, equal in tone and brilliancy to the best carmines and lakes now known or in use, and perfectly durable; the gold medal, or thirty guineas.

One pound weight of such colour, and a full disclosure of its preparation, to be produced to the Society on or before the first Tuesday in February, 1809.

N. B. It is not required that the colour should resist the action of fire or chemical applications, but remain unaltered by the common exposure to strong light, damps, and noisome vapours.

70. ULTRAMARINE. To the person who shall prepare an artificial ultramarine, equal in colour, brilliancy, or durability, to the best prepared from lapis lazuli, and which may be afforded at a cheap rate; the gold medal, or thirty guineas.

The conditions are the same as in the preceding premium for the red pigment.

71. BLUE PIGMENT FROM IRON. To the person who shall invent, and discover to the Society, the best blue pigment from iron, superior to Antwerp or Prussian blue in colour and durability, fit for use in oil or water, which may be afforded at a cheap rate; the gold medal, or thirty guineas.

One pound weight of the colour, and a full disclosure of its preparation, to be produced to the Society on or before the first Tuesday in February, 1809.

N. B. It appears from the analysis of lapis lazuli by Klaproth, and the experiments of Gayton, (related in the Annales de Chemie) that ultramarine is a blue sulphurat of iron, and that a blue substance much resembling it is constantly found amongst the scoriæ of blast furnaces where iron is reduced, the Society by offering the above premium wishes to call the attention of persons to these facts, and encourage them to make experiments, in the hope of producing a blue pigment which may be substituted for ultramarine.

72. DESTRUCTIVE EFFECTS FROM MOTHS.

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To the person who shall discover to the Society a cheap, easy, and effectual method, verified by repeated and satisfactory trials, of preventing the destructive effects occasioned by moths and other insects, in furs, woollens, and other articles, superior to any hitherto known or practised; the silver medal, or fifteen guineas.

The *accounts*, with proper *certificates*, to be produced to the Society on or before the first Tuesday in January, 1809.

73. STATUARY MARBLE. To the person who shall discover, within Great Britain or Ireland, a quarry of white marble fit for the purposes of statuary, and equal in all respects to those kinds now imported from Italy; the gold medal, or one hundred pounds.

A block of at least three feet in length, two in height, and two in width, with an account of the situation of the quarry, and *certificates* of its possessing considerable extent, to be produced to the Society on or before the first Tuesday in February, 1809.

N. B. In order to prevent useless expense or trouble to the claimant in forwarding so large a block, the Society will be ready to examine any smaller specimen of the marble, and express their opinion of its value to the candidate before the block required by the above premium is produced.

74. PREPARATION OF SULPHURIC ACID, FROM SULPHUR WITHOUT THE USE OF ANY NITRIC SALT. To the person who shall prepare the largest quantity (not less than one ton) of sulphuric acid from sulphur without any nitric salt, of a specific gravity not inferior to the best sulphuric acid of commerce; the gold medal, or fifty guineas.

Certificates that not less than the above quantity of such an acid has been prepared, together with a sample, to be produced to the Society on or before the first Tuesday in January, 1809.

75. PREPARATION OF ANY ALKALINE OR EARTHEN NITRATE. To the person who shall prepare, in Great Britain, the largest quantity, not less than one hundred weight, of any salt of nitric acid, with either earths or alkalis, by a method superior to, and as cheap as those hitherto practised; the gold medal, or one hundred guineas.

Certificates of the above quantity having been prepared, and a sample of not less than 28lb. to be produced to the Society on or before the last Tuesday in January, 1809.

76. FINE BAR IRON. To the person, in Great Britain, who shall make the greatest quantity of bar-iron, not less than ten tons, with coak, from coak pigs, equal in quality to the best iron imported from Sweden or Russia, and as fit for being converted into steel; the gold medal, or fifty guineas.

Samples, not less than one hundred weight, with *certificates* that the whole quantity is of equal quality, to be produced to the Society on or before the first Tuesday in January, 1809.

77. PRESERVING IRON FROM RUST. To the person who shall invent and discover to the Society a cheap composition, superior to any now in use, which shall effectually preserve wrought iron from rust; the gold medal, or fifty guineas.

A full description of the method of preparing the composition, with *certificates* that it has stood at least two years unimpaired, being exposed to the atmosphere during the whole time, to be produced to the Society, with ten pounds weight of the composition, on or before the first Tuesday in January, 1809.

78. REFINING BLOCK-TIN. To the person who shall discover to the Society the best method of purifying or refining block-tin, so as to render it fit for the finest purposes to which grain-tin is now applied, and not higher in price; the gold medal, or fifty guineas.

Certificates that not less than three tons have been so refined or purified, with a full detail of the process, and a quantity, not less than one hundred weight, of the tin so refined, to be produced to the Society on or before the first Tuesday in January, 1809.

79. GLAZING EARTHEN-WARE WITHOUT LEAD. To the person who shall discover to the Society the cheapest, safest, most durable, and most easily fusible composition, fit for the purpose of glazing the ordinary kinds of earthen-ware, without any preparation of lead, and superior to any hitherto in use; the gold medal, or thirty guineas.

Specimens of the ware so glazed, with proper *certificates* of its having succeeded, and a sample of the materials made use of, to be produced to the Society on or before the first Tuesday in February, 1809.

80. REFINING COPPER FROM THE ORE. To the person who shall discover to the Society the best method of separating, purifying, and refining copper from the ore, so as to render it fit for the finest purposes to which fine copper is now applied, and by a process superior to any hitherto known or in use, and not higher in price; the gold medal, or fifty guineas.

Certificates that not less than three tons have been so prepared or refined, and a quantity not less than one hundred weight of the copper so refined, to be produced to the Society on or before the first Tuesday in February, 1809.

81. MINERALOGICAL MAP OF ENGLAND AND WALES. To the person who shall complete and publish an accurate mineralogical map of England and Wales, on a scale of not less than ten miles to an inch, containing an account of the situation of the different mines therein, and describing the kinds of minerals thence produced; the gold medal, or fifty guineas.

Certificates of the accuracy of such map, together with the map, to be produced to the Society on or before the first Tuesday in

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February, 1809. The map to remain the property of the Society.

82. MINERALOGICAL MAP OF IRELAND. The same premium is offered for a mineralogical map of Ireland, on similar conditions.

83. MINERALOGICAL MAP OF SCOTLAND. The same premium is offered for a mineralogical map of Scotland, on similar conditions.

84. NATURAL HISTORY. To the author who shall publish, in the year 1808, the natural history of any county in England or Wales; the gold medal, or fifty guineas.

It is required that the several natural productions, whether animal, or vegetable, or mineral, peculiar to the county, or found therein, be carefully and specifically arranged and described, in order that the public may be enabled to judge what arts or manufactures are most likely to succeed in such county. The work to be delivered to the Society on or before the last Tuesday in January, 1809.

PREMIUMS IN POLITE ARTS.

85. HONORARY PREMIUMS FOR DRAWING, BY NOBILITY. For the best original drawing of any kind, by young gentlemen under the age of twenty-one, sons or grandsons of peers or peeresses in their own right, of Great Britain or Ireland; the honorary medal of the Society in gold.

86. The silver medal for the best copy.

87—88. The same premiums will be given, on the like conditions, to young ladies, daughters or grand-daughters of peers or peeresses in their own right, of Great Britain or Ireland.

89. HONORARY PREMIUMS FOR DRAWING, BY GENTLEMEN. For the best original drawing, of any kind, by young gentlemen under the age of twenty-one; the gold medal.

90. For the best copy, the silver medal.

91—92. The same premiums will be given for drawings by young ladies.

N. B. As the foregoing honorary premiums are intended only for such of the nobility and gentry as may hereafter become patrons or patronesses of the arts; persons professing any branch of the polite arts, or any business dependent on the arts of design, or the sons or daughters of such persons, will not be admitted candidates in these classes.

93. PREMIUMS FOR DRAWINGS IN GENERAL. For the best original drawing of any kind, by persons of either sex, under the age of twenty-one; the gold medal.

94. For the best copy; the silver medal.

95. HISTORICAL DRAWINGS. For the best historical drawing, being an original composition of three or more human figures, the height of the principal figure not less than eight inches, by persons of either sex under twenty-one years of age; the gold medal.

96. For the next in merit; the silver medal.

97. DRAWINGS OF OUTLINES. For the best outline, after the plaster cast, of any antique statue, by persons of either sex under the age of twenty-one, the figure not less than eighteen inches; the silver medal.

98. PAINTINGS IN OIL. For the best painting in oil, of a landscape after nature, the size thirty-six by twenty-eight inches, by persons of either sex under twenty-five years of age; the gold medal.

99. For the next in merit, the silver medal. Each candidate must mention from whence the view was taken.

100. DRAWING OF LANDSCAPES. For the best drawing, in water-colours, of a landscape after nature, not less than eighteen inches by twelve, by persons of either sex under twenty-one years of age; the silver medal.

101. DRAWINGS BY ENGRAVERS' PUPILS. For the best finished drawing of the fighting Gladiator, from a cast the size of the original marble, the size of the drawing not less than eighteen inches, by persons under twenty-one years of age; the silver medal.

102. ENGRAVING OF PORTRAITS. To the person who shall complete the best portrait engraved in the line manner; the gold medal.

It is required, that two impressions of the engraving be produced, and to remain the property of the Society.

103 For the next in merit; the silver medal, on similar conditions.

104. LINE ENGRAVINGS OF HISTORICAL SUBJECTS. For the best historical engraving of any size; the gold medal.

105. For the next in merit; the silver medal.

106. LINE ENGRAVINGS OF LANDSCAPES. For the best line engraving of a landscape, the gold medal.

107. For the next in merit; the silver medal.

N. B. It is not necessary, in the classes of line engravings, for the artist's name to be concealed. The first aquafortis proof is required to be sent in with two finished impressions. The aquafortis proof, and the two impressions, to remain the property of the Society.

108. PERSPECTIVE DRAWINGS OF MACHINES. For the best perspective drawings of machines, by persons under twenty-one years of age; the silver medal.

109. ENGRAVING ON WOOD OR METAL BLOCKS, &c. For the best engraving on wood or metal blocks, of an historical subject; the size of the principal figure not less than six inches in height, and the block to be at least twelve inches by nine; the gold medal.

Two or more impressions, with the block, to be produced to the Society. The impres-

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sions, but not the block, to remain the property of the Society.

110. For the next in merit; the silver medal, on similar conditions.

111. BRONZES. For the best drapery figure or group cast in bronze; if a single figure, not less than twelve inches high; and if a group, not less than nine inches; and which will require the least additional labour to repair; the gold medal, or the silver medal and twenty guineas.

The cast to be exhibited to the Society before it is begun to be repaired, with the original figure or group, together with a full explanation of the whole process.

112. MEDAL DIE ENGRAVING. For the best die engraving of one or more heads after the engraver's own model; the gold medal.

113. For the next in merit; the silver medal.

114. For the best die engraving of one figure, or a group consisting of not more than three figures, after the engraver's own model; the gold medal.

115. For the next in merit; the silver medal.

The dies, and two impressions or casts, and the model, in each claim for medal die sinking, to be produced to the Society. The impressions or casts, but not the model or die, to remain the property of the Society.

116. ARCHITECTURAL DESIGNS. For the best original design of an academy of arts, consisting of plan and elevation; the gold medallion. The drawing to remain the property of the Society.

For the next in merit; the silver medallion, on similar conditions.

The following inscription to be engraved on these medallions: *The Premium given by the Society for the Encouragement of Arts, Manufactures, and Commerce, in conformity to the Will of John Stock, of Hampstead, esq.*

117. ETCHING OF AN HISTORICAL PICTURE. For the best finished etching of an historical picture; the gold medal.

* 117. ETCHING OF A LANDSCAPE. For the best finished etching of a landscape, from a picture; the silver medal.

CONDITIONS
FOR THE POLITE ARTS.

All the claims under this class are to be produced to the Society on or before the last Tuesday in February, 1809; and no other articles in the class of Polite Arts to be admitted into the Society with a view to bounties after the last Tuesday in March.

No person who has gained the first premium in any class shall be admitted a candidate in a class of an inferior age; and no candidate shall receive more than one premium in one year.

No person shall be admitted a candidate in any class, who has already obtained the first premium in that class.

No more than one performance in any class shall be received from the same candidate.

All performances (to which premiums or bounties are adjudged) shall remain with the Society till after the first Wednesday in June, when they will be re-delivered, unless mentioned in the Premiums to the contrary.

No performance shall be admitted, that has obtained a premium, reward, or gratification, from any other society, or academy, or been offered for that purpose.

All performances that obtain premiums in the Polite Arts must have been begun after the publication of such premiums, except line engravings.

It is required, that the matters for which premiums are offered, be delivered in without names, or any intimation to whom they belong; that each particular thing be marked in what manner each claimant thinks fit, such claimant sending with it a paper sealed up, having on the outside a corresponding mark, and on the inside the claimant's name, residence, and age; which paper is not to be opened unless the candidate be successful, or by a special vote of the Society.

To encourage real merit, and prevent attempts to impose on the Society, by producing drawings made or retouched by any other person than the candidate, the Society require a specimen of the abilities of each successful candidate, under the inspection of the Committee of Polite Arts, in every instance where such proof may appear necessary.

All candidates in the Polite Arts are required to signify, on their drawings, whether the performances are originals or copies; and if copies, whence they were taken, and to mark thereon the class for which each is intended.

PREMIUMS FOR ENCOURAGING AND IMPROVING MANUFACTURES.

118. CLOTH FROM HOP-STALKS, &c. To the person who shall produce to the Society the greatest quantity, not less than 30 yards of cloth, at least 27 inches wide, made in Great Britain or Ireland, of hop-stalks or bines, or other raw vegetable substances, the produce of Great Britain or Ireland, superior to any hitherto manufactured from such substances, and which can be generally afforded as cheap as cloth of equal quality and appearance now made from hemp, flax, or cotton, and much finer in quality than any hitherto manufactured in England from hop-stalks, &c.; the gold medal, or thirty guineas.

One pound of the thread of which the cloth is made, and thirty yards of the cloth, together with proper *certificates* that the whole is manufactured from hop-stalks or bines, &c. to be produced to the Society on or before the first Tuesday in December, 1808.

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N. B. The Society is already in the possession of cloth made in England from hop-stalks or bines, which may be inspected by application to the Housekeeper.

* 118. HOGS' BRISTLES. To the person who shall prepare the greatest quantity of bristles, from swine bred in the united kingdoms, equal in quality to those imported from Russia or Prussia, and at as cheap a rate; the silver medal, or fifteen guineas.

Certificates, that not less than one hundred weight have been so prepared, and a sample of not less than fourteen pounds of such bristles, to be produced to the Society on or before the last Tuesday in February, 1809.

119. WICKS FOR CANDLES OR LAMPS. To the person who shall discover to the Society a method of manufacturing hop-stalks or bines, or any other cheap material, the growth of Great Britain, so as to render them equally fit for the purpose of supplying the place of cotton, for wicks of candles or lamps; twenty guineas.

Samples, not less than five pounds weight, of the wick so prepared, to be produced to the Society on or before the last Tuesday in December, 1808, with *certificates* that the whole quantity is equal in quality to the sample.

120. EXPERIMENTS TO ASCERTAIN THE PROPER THICKNESS OF WICKS FOR CANDLES. To the person who shall make known to the Society the most satisfactory result of a series of experiments, actually made by him to determine the best thickness of cotton wicks for candles, so as to obviate the defects of those commonly used; the silver medal, or ten guineas.

Certificates, that not less than one hundred weight have been so made, and six pounds of the candles, to be produced to the Society on or before the last Tuesday in February, 1809.

N. B. The intention in offering this premium, is to ascertain the proper thickness or bulk of the wick in proportion to that of the tallow, and to remove the unpleasant consequences and waste arising from the sparkling, or guttering of the candles in common use.

121. PAPER FROM RAW VEGETABLE SUBSTANCES. To the person in Great Britain, or Ireland, who shall, between the first of January, 1808, and the first of January, 1809, make the greatest quantity, and of the best quality, (not less than ten reams) of good and useful paper, from raw vegetable substances, the produce of Great Britain or Ireland, of which one hundred weight has not been used in manufacturing paper previous to January, 1807, superior to any hitherto manufactured from such substances, and which can be generally afforded as cheap as paper of equal quality and appearance now made from rags; twenty guineas.

N. B. The object of the Society being to add to the number and quantity of raw materials used in this manufacture, it is their wish to include every useful sort of paper, and to introduce such natural products as can be easily and cheaply procured in great quantities. The Society are in possession of two volumes containing a great variety of specimens of paper made from raw vegetable substances, viz. nettles, potatoe-haulm, poplar, hop-bines, &c. which volumes may be inspected by any person on application to the Housekeeper.

Certificates of the making such paper, and one ream of the paper, to be produced on or before the second Tuesday in January, 1809.

122. TRANSPARENT PAPER. To the person who shall discover to the Society a method of making paper from the pulp, that shall be perfectly transparent, and of a substance and body equal to foolscap, that shall take and bear common writing ink with the same facility and correctness as writing-paper generally in use; the silver medal, or twenty guineas.

Certificates of the making such paper, an *account* of the process, and one ream of the paper, to be produced on or before the second Tuesday in January, 1809.

123. CHINTS PATTERNS FOR CALICO-PRINTERS. For the best original pattern in a new taste, of light or dark-ground chintz for garment-work, or furniture, fit for the purposes of calico-printers, by persons of either sex; the gold medal. The pattern for which the premium is adjudged to remain the property of the Society.

124. For the next in merit; the silver medal, on similar conditions.

125. COPPER-PLATE PATTERNS FOR CALICO-PRINTERS. For the best pattern, in a new style, fit for the purposes of calico-printers for garment work, or furniture; the silver medal. The pattern for which the premium is adjudged to remain the property of the Society.

N. B. The patterns to be produced on or before the last Tuesday in February, 1809.

PREMIUMS IN MECHANICS.

126. GUNPOWDER-MILLS. To the person who, in the year 1808, shall invent and bring to perfection the most effectual method of so conducting the works of gunpowder-mills, in the business of making gunpowder, as to prevent explosion; the gold medal, or one hundred guineas.

Certificates and *accounts* of the method having been put in practice in one or more gunpowder-mills in this kingdom, and that it promises, in the opinion of the best judges concerned in such works, to answer the purpose intended, to be produced to the Society on or before the first Tuesday in February, 1809.

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N. B. As an encouragement to persons to turn their thoughts to improvements of this nature, if any should be made on the present method of conducting the business of gunpowder making, which fall short of the total prevention of explosion, and they are sent to the Society for the sake of humanity, the papers so sent in will receive due consideration, and such bounty or reward will be bestowed as they may appear to merit.

127. TRANSIT INSTRUMENT. To the person who shall invent and produce to the Society a cheap and portable transit-instrument which may easily be converted into a zenith-sector, capable of being accurately and expeditiously adjusted for the purpose of finding the latitudes and longitudes of places, and superior to any portable transit-instrument now in use; the gold medal, or forty guineas.

To be produced on or before the last Tuesday in January, 1809.

128. TAKING WHALES BY THE GUN-HARPOON. To the person who, in the year 1808, shall strike the greatest number of whales, not fewer than three, with the gun-harpoon; ten guineas.

Certificates of the striking such whales, and that they were actually taken in the year 1808, signed by the master, or by the mate, when the claim is made by the master, to be produced to the Society on or before the last Tuesday in December, 1808.

129. FAMILY-MILL. To the person who shall invent and produce to the Society the best-constructed mill for grinding corn for the use of private families, or parish-poor; the construction to be such as to render the working of the mill easy and expeditious, and superior to any hitherto in use; the gold medal, or thirty guineas.

The mill, and *certificates* of its having been used to good effect, to be produced to the Society on or before the first Tuesday in February, 1809. Cheapness and simplicity will be considered as essential parts of its merit; and the mill or a model, to remain with the Society.

130. MACHINE FOR RAISING COALS, ORE, &c. &c. To the person who shall invent a machine for raising coals, ore, &c. from mines, superior to any hitherto known or in use; and which shall produce the effect at a less expense than those already known, or in use; the gold medal, or fifty guineas.

A model of the machine, made on a scale of not less than one inch to a foot, with a *certificate* that a machine at large on the same construction has been advantageously used, to be produced to the same Society on or before the second Tuesday in February, 1809.

131. IMPROVED WALKING-WHEEL, OR CRANE. To the person who shall invent an improved walking-wheel or crane, on which the weight and power of any person or persons shall be applied with the greatest safety and effect, and so contrived that the power can be varied according to the greater or less weight to be raised or lowered; the gold medal, or thirty guineas.

The model, on a scale of not less than one inch to a foot, with a proper *certificate* that the machine at large has been employed to good effect, to be produced to the Society on or before the second Tuesday in February, 1809.

132. MACHINE FOR RAISING WATER. To the person who shall invent a machine on a better, cheaper, and more simple construction than any hitherto known or in use for raising water out of wells, &c. from a depth of not less than fifty feet; the gold medal, or thirty guineas.

Certificates of the performance of the machine, and a model of it, on a scale of not less than one inch to a foot, to be produced to the Society on or before the first Tuesday in February, 1809.

133. ELM PIPES. To the person who shall invent and discover to the Society a substitute for the elm pipes now in common use for the conveyance of water, which shall be cheaper, equally effectual, and more durable than any heretofore employed; the gold medal, or thirty guineas.

It is required that one of the pipes so employed, an accurate *account* of the method used, and every expense attending it, together with satisfactory accounts of its being effectual, be delivered to the Society on or before the second Tuesday in January, 1809.

134. LAYING WOODEN PIPES. To the person who shall invent and discover to the Society a superior method of laying or connecting the wooden pipes now in use for conveying water, so as to lessen the injury they receive thereby; the silver medal, or fifteen guineas.

It is required that a model, an accurate *account* of the method used, and every expense attending it, together with satisfactory *certificates* of its being effectual, be delivered to the Society, on or before the second Tuesday in January, 1809.

135. EXTINGUISHING FIRES. To the person who shall produce to the Society the best and most effectual method of procuring an immediate supply of water in case of fire, or for the means best calculated to prevent or extinguish accidental fires in buildings, superior to any now in use; the gold medal, or thirty guineas.

Certificates of the method having been practised with success, with a full description thereof, to be delivered to the Society on or before the second Tuesday in January, 1809.

136. BORING AND BLASTING ROCKS. To the person who shall discover to the Society a more simple, safe, cheap, and expeditious method than any hitherto known

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or in use, of boring or blasting rocks in mines, shafts, wells, &c.; the gold medal, or thirty guineas.

Certificates of the method having been practised with success, with a full description thereof, to be delivered to the Society on or before the first Tuesday in January, 1809.

137. HEATING ROOMS FOR THE PURPOSE OF MANUFACTURERS. To the person who shall invent and discover to the Society a method of heating rooms, superior to any hitherto known or in use, and at a moderate expense, for the purpose of painters, japanners, and other manufacturers, so as to avoid the necessity of iron or copper tunnels going through the rooms to convey the smoke, whereby the danger from such tunnels may be prevented; the gold medal, or forty guineas.

A model or complete drawing and description of the method, with *certificates* that it has been successfully practised, to be delivered to the Society on or before the last Tuesday in March, 1809.

138. IMPROVED VENTILATION. To the person who shall invent and produce to the Society a mode of permanently ventilating the apartments in hospitals, workhouses, and other crowded places, superior to any now known or used; the gold medal, or fifty guineas.

A model of the apparatus, and a full *account* of the means by which the effect has been produced, with proper *certificates*, to be delivered to the Society on or before the last Tuesday in February, 1809.

139. PREVENTING ACCIDENTS FROM HORSES FALLING WITH TWO-WHEELED CARRIAGES. To the person who shall invent and produce to the Society a method, superior to any hitherto known or in use, to prevent accidents from the falling of horses with two-wheeled carriages, especially on steep declivities; the silver medal, or fifteen guineas.

A model of the apparatus, and a full *account* of the means by which the effect has been produced, with proper *certificates* that the same has been used with success, to be delivered to the Society on or before the second Tuesday in January, 1809.

140. IMPROVING TURNPIKE AND OTHER ROADS. To the person who shall discover to the Society the most effectual and cheapest method, verified by actual experiments, of combining the materials ordinarily employed in making or repairing roads, so as to form them of the hardest consistency by their cementing properties, or by an artificial mixture of earth, stones, &c. altered by heat or any other mode, so as to form an even, hard, and durable carriage-road, not liable to be injured by heat or rain; the gold medal, or thirty guineas.

It is required that an accurate *account* of the method used, and every expense attending it, together with satisfactory *certificates* of its being effectual, be delivered to the Society on or before the first Tuesday in March, 1809.

141. RAISING THE BODIES OF PERSONS WHO HAVE SUNK UNDER WATER. To the person who shall invent and produce to the Society a cheap and portable drag, or other machine, superior to those now in use, for the purpose of taking up, in the best and most expeditious manner, and with the least injury, the bodies of persons who have sunk under water; the gold medal, or thirty guineas.

The drag, or machine to answer the purpose intended, to be produced to the Society on or before the first Tuesday in March, 1809.

142. FOR PREVENTING PREJUDICIAL EFFECTS TO THE PERSONS EMPLOYED IN POINTING NEEDLES. To the person who shall invent and produce to the Society a mode of obviating the prejudicial effects that attend the operation of pointing needles, by grinding them dry, during which the particles of grindstone, dust, and steel, being thrown into the air, and received with it into the lungs, occasion asthma, consumption, and other painful disorders; the gold medal, or thirty guineas.

A model of the apparatus, and a full *account* of the means by which the effect has been produced, together with proper *certificates* of its practicability and adoption, to be delivered to the Society on or before the second Tuesday in March, 1809.

PREMIUMS OFFERED FOR THE ADVANTAGE OF THE COMMERCE OF THE UNITED EMPIRE.

143. TAKING PORPOISES. To the people in any boat or vessel, who, in the year 1808, shall take the greatest number of porpoises on the coast of Great Britain or Ireland, by gun, harpoon, or any other method, not fewer than thirty, for the purpose of extracting oil from them; the gold medal, or thirty pounds.

Certificates of the number, signed by the persons to whom they have been sold or delivered for the purpose of extracting the oil, to be produced to the Society on or before the last Tuesday in January, 1809.

144. OIL FROM PORPOISES. To the person who shall manufacture the greatest quantity of oil from porpoises taken on the coast of Great Britain or Ireland, in the year 1807, not less than twenty tons; the gold medal, or thirty pounds.

Certificates of the oil having been made from porpoises actually caught on the coast of Great Britain or Ireland, and two gallons of the oil as a sample, to be produced to

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ociety on or before the last Tuesday in nary, 1809.

5. CURING HERRINGS BY THE DUTCH HOD. To the person or persons who before January 1809, cure the greatest ity of white herrings, not less than thirty ls, according to the method practised ie Dutch, and equal in all respects to est Dutch herrings, the same being it in the British or Irish seas, and cured British or Irish vessel or port; the gold l, or fifty guineas.

6. For the next greatest quantity, not han fifteen barrels; the silver medal, or ty guineas.

sixteen-gallon barrel of the herrings to oduced to the Society on or before the Tuesday in February, 1809, with *Certifi-* that the conditions of the premium have fulfilled, and that the whole were cured e same manner as the specimen, toge- with a full description of the process oyed, in order that the Society may how far the Dutch method has been ted.

7, 148. The same premiums are ex- ed one year farther. *Certificates* to be nced on or before the first Tuesday in uary, 1810.

MIUMS OFFERED FOR THE DVANTAGE OF THE BRITISH OLONIES.

9. NUTMEGS. For the greatest quan- of merchantable nutmegs, not less than ounds weight, being the growth of his sty's dominions in the West Indies, or f the British settlements on the coast of a, or the several islands adjacent there- nd equal to those imported from the ls of the East Indies; the gold medal, ty guineas.

tisfactory *certificates*, from the gover- or commander in chief, of the place of th, with an *account* of the number of , their age, nearly the quantity of fruit ich tree, and the manner of culture, to oduced on or before the first Tuesday ecember, 1808.

0. The same premium is extended one farther.

rtificates to be produced on or before irst Tuesday in December, 1809.

1. KALI FOR BARILLA. To the person shall have cultivated, in the Bahama ds, or any other part of his Majesty's nions in the West Indies, or any of the sh settlements on the coast of Africa, or everal islands adjacent thereto, in the 1807, the greatest quantity of land, not han two acres. with Spanish kali fit for urpose of making barilla; the gold me- or thirty guineas.

2. For the next greatest quantity, not less than one acre; the silver medal, or fifteen guineas.

Certificates, signed by the governor or commander in chief for the time being, of the quantity of land so cultivated, and of the state of the plants at the time of signing such *certificates*, to be delivered to the Society, with samples of the kali, on or before the second Tuesday in January, 1809.

153. The same premiums are extended one year farther.

Certificates to be produced on or before the second Tuesday in January, 1810.

154. DESTROYING THE INSECT COMMONLY CALLED THE BORER. To the person who shall discover to the Society an effectual method of destroying the insect commonly called the Borer, which has of late years been so destructive to the sugar-canes in the West-India islands, the British settlements on the coast of Africa, and the several islands adjacent thereto; the gold medal, or fifty guineas.

The discovery to be ascertained by satisfactory *certificates*, under the hand and seal of the governor or commander in chief for the time being, and of some other respectable persons, inhabitants of the islands, or other place, in which the remedy has been successfully applied; such *certificates* to be delivered to the Society on or before the first Tuesday in January, 1809.

155. The same premium is extended one year farther.

Certificates to be produced on or before the first Tuesday in January, 1810.

156. CULTIVATION OF HEMP IN UPPER OR LOWER CANADA. To the person who shall sow with hemp, the greatest quantity of land in the province of Upper Canada, not less than six arpents, (each four-fifths of a statute acre) in the year 1808, and shall at the proper season cause to be plucked the summer hemp, or male hemp bearing no seed, and continue the winter hemp, or female hemp bearing seed, on the ground until the seed is ripe; the gold medal, or one hundred dollars.

157. To the person who shall sow with hemp the next greatest quantity of land in the same province of Upper Canada, not less than five arpents in the year 1808, in the manner above mentioned; the silver medal, or eighty dollars.

158. For the next greatest quantity of land, in the same province, and in a similar manner, not less than four arpents; sixty dollars.

159. For the next greatest quantity of land, in the same province, and in a similar manner, not less than three arpents; forty dollars.

160. For the next greatest quantity of land, in the same province, and in the same manner, not less than one arpent; twenty dollars.

Certificates of the number of arpents, the method of culture, of the plucking of the hemp, with a general *account* whether sown

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broad-cast or in drills, the expense, soil, cultivation, and produce, to be transmitted to the Society, certified under the hand and seal of the governor or lieutenant-governor, together with 28lb. of the hemp, and two quarts of the seed, on or before the last Tuesday in November, 1809.

161 to 165. Premiums exactly similar in all respects to those held out for the province of Upper Canada, are also offered for the province of Lower Canada, and are extended to the same period.

166. IMPORTATION OF HEMP FROM CANADA. To the master of that vessel which shall bring to this country the greatest quantity of marketable hemp, not less than one hundred tons, in the year 1808, the produce of Upper or Lower Canada; the gold medal.

167. To the master of that vessel which shall bring the next quantity, not less than fifty tons; the silver medal.

Certificates satisfactory to the Society, to be produced by the master of the vessel on or before the first Tuesday in February, 1809, to testify that such hemp was grown and prepared in Canada.

168. SUBSTITUTE FOR HEMP. To the person who, in the year 1808, shall discover and produce to the Society a substitute for hemp, equally cheap, durable, and applicable to all the purposes for which hemp is now used; the gold medal, or fifty guineas.

A quantity of the substitute, not less than one hundred weight, together with proper *certificates* from the governor or commander in chief, if raised in any of the British colonies, or from the Secretary of the Board of Trade, if raised in the East Indies, to prove that the same has been used with success, to be produced to the Society on or before the last Tuesday in February, 1809.

169. The same premium is extended one year farther.

Certificates to be produced on or before the last Tuesday in February, 1810.

PREMIUMS OFFERED FOR THE ADVANTAGE OF THE BRITISH SETTLEMENTS IN THE EAST INDIES.

170. BHAUGULPORE COTTON. To the person who shall import into the port of London, in the year 1808, the greatest quantity, not less than one ton, of the Bhaugulpore cotton, from which cloths are made in imitation of nankeen, without dying; the gold medal.

A quantity of the cotton, not less than five pounds weight, in the pod, and five pounds carded, to be produced to the Society, with proper *certificates*, signed by the Secretary to the Board of Trade of Bengal or Bombay, on or before the last Tuesday in February, 1809.

171, 172. The same premium is extended two years farther.

Certificates to be produced at the same time of the years ensuing.

173. ANNATTO. To the person who, in the year 1808, shall import into the port of London, from any part of the British settlements in the East Indies, the greatest quantity of annatto, not less than five hundred weight; the gold medal.

A quantity of the annatto, not less than ten pounds weight, to be produced to the Society, with proper *certificates*, signed by the Secretary of the Board of Trade of the respective settlement, that the annatto is the produce of such settlement, on or before the last Tuesday in February, 1809.

174, 175. The same premium is extended two years farther.

Certificates to be produced at the same time of the years ensuing.

176. TRUE COCHINEAL. To the person who, in the year 1808, shall import into the port of London, from any part of the British settlements in the East Indies, the greatest quantity of true cochineal, not less than five hundred weight; the gold medal.

A quantity of the cochineal, not less than ten pounds weight, with proper *certificates*, signed by the Secretary of the Board of Trade of the respective settlement, that the cochineal is the produce of such settlement, to be produced to the Society on or before the first Tuesday in February, 1809.

177, 178. The same premium is extended two years farther.

Certificates to be produced at the same time of the years ensuing.

GENERAL CONDITIONS.

As the great object of the Society in rewarding individuals is to draw forth and give currency to those inventions and improvements, which are likely to benefit the public at large, candidates are requested to observe, that if the *means*, by which the respective objects are effected, do require an expense or trouble too great for *general purposes*, the Society will not consider itself as bound to give the offered *reward*; but, though it thus reserves the power of giving in all cases such part only of any premium as the performance shall be adjudged to deserve, or of withholding the whole if there be no merit, yet the candidates may be assured the Society will always judge liberally of their several claims.

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All candidates are to take notice, that no claim for a pre
less the conditions of the advertisement are fully complied
All models of machines, which obtain premiums or bo
the Society; and, where a premium or bounty is given fo
and description thereof shall be given to the Society.
All the premiums of this Society are designed for Gre
pressly mentioned to the contrary.
The claims shall be determined as soon as possible af
It is expected that all articles for claims or bounties
No person shall receive any premium, bounty, or er
any matter for which he has obtained, or purposes to
obtained, or expects any premium or reward from ar
A candidate for a premium, or a person applying
disingenuous method to impose on the Society, sha
incapable of obtaining any for the future.
No member of this Society shall be a candic
mium, bounty, or reward whatsoever, except the
candidates are, in all cases, expected to furnish
claims; and where certificates are required to
should be expressed, as nearly as possible, in t
and be signed by persons who have a positive
Where premiums or bounties are obtained
Society mean to retain such part of those spe
a reasonable allowance for the same.
No candidate, not a member, shall be pr
mittees, or admitted at the Society's rooms
such claims are adjudged, unless summone
The Society, anxious to promote the A
of forming a Collection of Prints, to be o
those already in their possession, invite e
plates: and hope that amateurs, collec
tribute to the undertaking.
Prints of machines, or maps, will als
The Society farther invite the comm
subjects connected with the views
been conducted upon a smaller scale
communications may afford ground
contribute to the advantage of the
The Library of the Society, whi
considerable additions and improv
who may be inclined to place use
once permanent and conducive t
All communications are to be
Secretary, *at the Society of Arts*
The Winchester bushel is th
districts vary in extent, it is n
five and a half yards to the ro
and they request that all com
The Society desire that the
plicit, fit for publication, and
tive Drawings may be sent,
*** To persons inclined
form is offered for that pu
Item. I give and bequ
condition and to the inte
for the time being, of a
Encouragement of Arts
I will and desire may
on the laudable design
N. B. The Society
Kingdom to bring the
thod of accomplishin
known in the capit
Resolved,—Tha
the Adelphi, for th

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1st, That all specimens be exact to a given size, *viz.* eight inches high, six inches broad, one inch thick, and polished on one face.

2d, That a book be kept, containing the number of each specimen, and describing the situation of the quarry, the name of the parish where situated, the distance of the quarry from a beaten road, and the distance of that road from water-carriage, with the name of the donor and proprietor. Any remarks on the qualities of the marbles, or on the lime produced from them, will be gratefully received and preserved by the Society, as materials for future inquiries.

Resolved,—That as the exertions of the Society can be beneficial to the public, only inasmuch as their views are seconded by the public, the Society request, that all persons, proprietors of marble quarries, will favour them with a specimen of the marble, worked to the exact size above mentioned, with the description of the quarry as above, that the same may be entered in the book to be preserved for the use of the public.

Premiums and Rewards bestowed in May, 1808, *by the Society of Arts, Manufactures, and Commerce, Adelphi.*

ON Tuesday the 31st of May, 1808, the Rewards of the Society were, as usual, distributed by his Grace the Duke of Norfolk, arranged under the following classes; and on Wednesday the 1st of June, the Society held the last Meeting of that Session, and adjourned to the fourth Wednesday in October next.

IN AGRICULTURE.

To John Christian Curwen, Esq. M. P. of Workington Hall, Cumberland, for improvements in the culture of vegetables, the gold medal.

To the Right Hon. the Earl of Mansfield, for planting 96,000 Oaks at Scone, near Perth, class 3; the gold medal.

To the Right Hon. Lord Boringdon, for gaining land from the sea, at Chelsea Bay, near Plympton, and at Charlton, near Kingsbridge, class 17, the gold medal.

To the Right Reverend Lord Bishop of Llandaff, for planting 322,500 larch trees, near Newby Bridge, Lancashire, class 10, the gold medal.

To A. Bain, M. D. of Curzon Street, for planting 338,199 forest trees, at Heffleton, in Dorsetshire, class 14, the gold medal.

To Robert Burrows, Esq. of Great Witchingham, Norfolk, for comparative culture of wheat, class 17, the gold medal.

To Mr. Charles Waistell, of High Holborn, for his communication of methods to ascertain the value of growing timber trees, at different and distant periods, the gold medal.

To J. Butler, Esq. Bramshott, Hants, for improving waste land, the silver medal.

To William Lawrence, Esq. of Maldon, Essex, for gaining land from the sea, the silver medal.

To Mr. Samuel Curtis, Walworth, for planting above 4,000 fruit trees, for an orchard at Bradwell, in Essex, the silver medal.

To Mr. Richard Parkinson, Walworth, near London, for cure of the foot-rot in sheep, class 49, the silver medal.

To Mr. W. Wallis Mason, Goodrest Lodge, near Warwick, for a method of stabbing hoven cattle, to discharge the rarified air from the stomach when they have been over-fed with moist clover grass, the silver medal.

To Mr. Timothy Fisher, Ormskirk, Lancashire, for a swivel-headed churn staff, to facilitate the making of butter; five guineas.

IN CHYMISTRY.

To Mr. William Anderson, of his Majesty's dock-yard, Portsmouth, for a method of painting linen cloth in oil colours, to be more pliant, durable, and longer impervious to water, than in the usual mode, the silver medal.

To Mr. Thomas Saddington, No. 73, Lower Thames Street, for a cheap method of preserving fruit without sugar for house use, or sea stores, five guineas.

IN POLITE ARTS.

To Mr. Samuel Wharton, Neat-Houses, Chelsea, for an original drawing of ornamental Architecture, the silver medal.

To Mr. Henry Parke, Dean Street, Soho, for a drawing of a sea piece, class 90; the silver medal.

To Mr. D. Dighton, Charing Cross, for an original drawing of the battle of King Richard and Saladin, the silver medal.

To Miss Aspinall, Quality Court, Chancery Lane, for a Drawing of the Death of Virginia, the silver medal.

To Mrs Coppins, St. Stephens, Norwich, for the copy of an oil painting after Teniers, the silver medal.

To Miss Charlotte Delattre, North End, Fulham, for a drawing of the Grecian Daughter nourishing her father, the silver medal.

To Mr. Philip Rogers, Great Pulteney Street, for an original oil painting of a landscape, the silver medal.

To Mr. W. Finden, Warren-Street, Fitzroy Square, for a drawing of the Gladiator, class 101, the silver medal.

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To Mr. William Thomas, Upper Charlotte reet, Fitzroy Square, for a drawing of St. ugustin preaching in Britain, the smaller rer pallet.

To Miss Barron, Carmarthen Street, Tot-nham Court Road, for a drawing of the e plant from nature, the silver medal.

To Miss Eliza Hamilton, James Street, ckingham Gate, for a drawing of red er, class 92, the silver medal.

To Miss Mary Watts, Portland Place, for rawing of a landscape after Both, the sil-r medal.

To Mr. E. Hodges Baily, Upper Cleve-d Street, for a plaster cast of the Laocoon, silver medal.

To Mr. Joseph Gott, Upper Norton eet, for an original plaster cast of Samp-slaying the Philistines, the greater sil-pallet.

To Mr. W. Woolnoth, Gloucester Place, nden Town, for a fine engraving of Tick-te Church, in Rutlandshire, the larger er pallet.

To Miss Elizabeth Ann Barlow, of Somer-Place, for a drawing of a landscape, the aller silver pallet.

To Miss Mary Okes, of Cambridge, for a wing from a design for a gothic hall, the aller silver pallet.

To Miss Eliza Dinwiddie, Titchfield eet, for a drawing of the island of Capri, smaller silver pallet.

To Mr. J. C. Bromley, Brook Green, mmersmith, for an etching of cattle, the aller silver pallet.

To Master William Ross, Twistock Street, vent Garden, for an original drawing of Judgment of Solomon, the silver medal.

To Miss Mary Ann Barron, Carmarthen eet, Tottenham Court Road, for a draw-from a scene in the play of Titus Andro-us, the smaller silver pallet.

To Miss Mary Williams, for an oil paint-of St. Girolamo, after a copy from Cor-io, the greater silver pallet.

To Mrs. Emma Jane Hooker, of Retting n, near Brighton, for an encaustic paint-, in imitation of the ancient Grecian man-, the silver medal.

IN MANUFACTURES.

To George Whitworth, Esq. of Coxwold, r Castor, Lincolnshire, for his exertions manufacturing ropes and sacking from ep's wool, to answer the purpose of similar cles made from hemp, the gold medal.

To Mr. Peter Tansley, of Wheeler Street, Spital-fields, for a cheaper method of cutting silk shag, five guineas.

IN MECHANICS.

To Captain George William Manby, of Yarmouth, for forming a communication with ships stranded, by means of a rope thrown over the vessel from a mortar on the shore, the gold medal.

To Captain Wm. Bolton, R. N. for improved jury masts, formed from the common articles on board ships, and on a plan to enable them to carry the usual press of sail, the silver medal.

To Captain H. L. Ball, R. N. of Mitcham, in Surrey, for an improvement in anchor stocks, to render them more durable and safe for ships, the silver medal.

To Mr. Thomas Roberts, of the Navy Office, for improvements in ship building, by securing the ends of the beams of ships without wooden knees, the silver medal.

To Major Charles le Hardy, of the isle of Jersey, for a telegraph of a new construction, referring to any number of words under forty thousand, the silver medal.

To the Chevalier Edelcrantz, of Stockholm, for his model of the telegraph used in Sweden for conveying intelligence, the silver medal.

To Mr. Henry Ward, of Blandford, Dorsetshire, for an ingenious crank in working telegraphs, ten guineas.

To Mr. Robert Richardson, of Keswick, in Westmoreland, for an easy and simple method of raising large stones out of the earth, ten guineas.

To Mr. William Barlow, of the dock-yard, Portsmouth, for a screw wrench to fit different sized heads of screws, five guineas.

To Mr. John Tad, Little Hermitage-street, Wapping, for a method of preventing doors from dragging on carpets, five guineas.

COLONIES AND TRADE.

To George Errington, Esq. of Yarmouth, for his improvements in the cure of white herrings, resembling the Dutch pickled herrings, the silver medal.

To Mr. Ezekiel Cleall, of West Coker, near Yeovil, Somersetshire, for a machine for thrashing out hemp seed and flax seed, recommended for use in Canada, to preserve the seed in a better state for vegetation, twenty guineas.

The number of Members elected since October, 1807, *is* 116.

List of Premiums offered may be had, *gratis*, at the Society's House in the Adelphi;

By Order of the Society,

ne, 1808. CHARLES TAYLOR, M. D. Secretary.

C. WHITTINGHAM, Printer, Goswell Street.

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COMMUNICATIONS

IN THE

SEVERAL DEPARTMENTS

OF

AGRICULTURE,
CHEMISTRY,
MANUFACTURES,
MECHANICS,

AND

COLONIES AND TRADE.

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PAPERS

IN

AGRICULTURE.

The GOLD MEDAL *of the Society being the Premium offered for planting* OAKS, *was this Session adjudged to the Right Hon. the* EARL OF MANSFIELD, *from whom the following Communications were received.*

SIR,

ON behalf of Lord Mansfield, as a candidate for a premium for raising oaks, since the year 1803, I beg leave through you to submit the following statement to the Society of Arts, &c. viz.

That since the year 1803, I have raised and planted for the Earl of Mansfield at Scone, near Perth, Perthshire, 96,000 oaks, part of them raised from acorns in his lordship's nursery, and part from young plants; the whole of them are properly fenced with hedge and ditch, and where that was impracticable, with strong paling. Part of the ground planted consists of steep banks on the side of a brook, and the river Tay, the remaining part common moor—the

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banks were made and planted in the common way—the moor was planted after a different manner: the whins, or furze, with which it was partly covered, were burnt, and the land ploughed as well as the nature of it would admit, (being very rough and stony,) in the autumn 1804, and summer 1805, and before planting laid up in ridges of four feet breadth, which, with some open drains cut through them, laid the whole completely dry, and the oaks were put in on the top of the ridges.

The above treatment was suggested to me by Lord Mansfield, and is, I believe, a new mode, which has met with the approbation of every one who has seen it, as it lays the land dry, and prevents the young plants being thrown out by the frost in winter, to which, by the nature of the soil and climate here, they are very liable to. It lays a greater quantity of surface mould round them, in which they grow freely while young, and although a bad soil, the whole are in a more healthy and thriving state than other plantations near them; as the following certificate from experienced and respectable nurserymen and gardeners will show, who have viewed the whole, in order to certify the state they are in, agreeable to the Rules of the Society.

Any further statement or explanation deemed necessary will be readily furnished by addressing a line to me, gardener to the Earl of Mansfield at Scone near Perth.

I am, Sir,

Your most obedient servant,

WILLIAM BEATTIE.

Scone Gardens, 18th Dec. 1807.

To C. TAYLOR, M. D.
Secretary to the Society of Arts, &c.

Certificate

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Certificate of the Truth of the foregoing Statement.

WE the undersigned having viewed the plantations referred to in the foregoing report, do hereby certify that they are in a healthy and thriving state, (in particular those on the common moor,) that there is at least 500 plants per acre in that state, and the whole are fenced as represented.

JOHN BURTON, *late Gardener to Earl Ferrers.*
ROBERT BROWN, Nurseryman, Perth.
JAMES BROWN, ditto.

A Certificate to the same effect, was likewise received by the Society, signed by the Rev. WILLIAM AITKIN, Minister of the Parish of Scone.

The GOLD MEDAL *of the Society being the Premium offered for planting* LARCHES, *was this Session adjudged to the Right Rev. the* LORD BISHOP OF LANDAFF, *for planting* 322,500 LARCH TREES, *near Newby Bridge, Lancashire, from whom the following Accounts and Certificates were received.*

SIR,

IN 1789, I was honoured by the Society with a Gold Medal, for having planted forty-eight thousand larches on a high barren mountain, called Wansfel, near Ambleside. This was the first plantation which had been made in this

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country on such an exposed situation, and I was told by every body that it would never thrive. I have great pleasure therefore in assuring the Society that it flourishes beyond my expectation. The trees on an average now measuring above eleven inches in circumference, at six feet from the ground.

I herewith transmit to you a certificate of my having planted on two contiguous mountains, called Birkfell and Gomershow, situated near the foot of Winandermere, three hundred and twenty-two thousand five hundred larches; and a certificate also signed by two most respectable gentlemen of the present state of the two plantations. I do not know the exact height of either of these mountains, but Gomershow is seen at a great distance in every direction, above the rest of the mountains on the borders of the lake, and the surface of the lake is more than one hundred feet above the level of the tide at high water.

I have some expectation of coming into possession of a large portion of land on the top of Skiddaw, a mountain near Keswick, one thousand and ninety yards in height; and if I should succeed in this expectation, it is my intention to plant it with larches, that I may leave to posterity either a convincing proof that in this climate the larch tree will flourish on the highest mountains in Great Britain, or a mark of my folly, to warn others from attempting to render land so situated beneficial to the state, and to themselves, by planting it.

Many men are deterred from planting by an apprehension of the expense attending the requisite fencing, but this expense is not great when a plantation is large, and the fence is situated on the acclivity of a hill, for the rise of the hill will very much reduce the height of the wall, especially

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foot in depth, and
wall.

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inclose four times 8

With my best
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community,

Calgurth Park, Kenda
October 17, 1807.
To C. TAYLOR, M

I, ROBERT ATK
the 27th day of Nc
planted with proper
hundred and twenty
mountain called Bi
the parish of Cartm
hereby further cert
the 25th of March

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a mountain called Gomershow, adjoining to Birkfell, two hundred thousand larches. The larches of both plantations had been transplanted one or two years, and were from 12 to 24 inches in length; the trees were planted in rows at the distance of six feet from each other, and the plants in each row were at the same distance, where rocks would permit. Holes in the ground were made with a hack, and the plants were well trodden down. The plantations are well fenced with stone walls, and the trees are now in a flourishing condition.

ROBERT ATKINSON.

Oct. 13th, 1806.

Certificates were received from JEREMIAH DIXON, Esq. of Fellfoot, and WILLIAM TOWNLEY, Esq. of Townhead, dated Oct. 12th 1807, declaring the above accounts to be true and correctly stated; that they had lately viewed the ground, and found the plants in a very thriving condition.

The GOLD MEDAL *of the Society, being the Premium offered for gaining the greatest Quantity of* LAND *from the Sea, was this Session adjudged to the Right Hon.* LORD BORINGDON, *from whom the following Accounts were received.*

SIR,

OBSERVING in the last Volume of the Transactions for the Encouragement of Arts, Manufactures, and Commerce, that

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that amongst the various Premiums offered by the Society, a Premium is proposed to "the person who shall produce to the Society an account, verified by actual experiment, of his having gained the greatest quantity of land from the sea, not less than 50 acres, on the coast of Great Britain and Ireland, and that the work was commenced subsequently to the 1st of January 1800." I have the honour to acquaint you, that by means of an embankment, which was begun in the spring 1806, I have obtained from the sea 175 acres.

The land which has been gained was formerly called Chelson Bay, and was overflowed twice every 24 hours by the tide of the sea. For the construction of the embankment I contracted with Mr. James Green, Engineer, of Birmingham, a gentleman of very distinguished science in the profession to which he belongs, and to whose unceasing zeal and attention I attribute the success of the work. The embankment is about 970 yards, or 2910 feet in length, the average height above the surface of the mud is about 16 feet perpendicular, at which height it is considered to be two feet above the highest tide ever known; the average width of the base is about 91 feet, the width at top three feet, the slope on the outside (next to the sea) is covered with limestone paving, underneath which is a water-tight puddle of about three feet thick, which prevents the water penetrating in any part; the inside slope is soiled and sown with grass seeds. It was originally intended to give the surface of the embankment (next to the sea) a regular slope throughout, of four feet horizontal to one foot perpendicular, and to make the inside slope as one foot six inches horizontal to one foot perpendicular; but, in the progress of the work, it was ascertained that the embankment would require to be

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raised two feet higher than had been at first apprehended, and it became necessary to widen the base in order to increase the height; and as the front slope was then in great part paved, this could best be done on the inside.

On adding this additional weight of earth to the embankment, the mud on which it was founded gave way, in such a manner as to render it next to impossible to continue the slopes in the form first intended; in order therefore to rest, as much as possible, the additional weight on the great body of materials, it was determined to give the last three feet in height a slope of two feet horizontal to one foot perpendicular, (in front,) joining it to the flatter part of the slope to avoid a direct angle by giving it a concave appearance; the width of the top of the embankment is continued three feet, and the inside slope is increased to five feet horizontal to three feet perpendicular. This alteration appears to have had the desired effect.

The water coming from the high lands on each side of the land embanked, is collected in a drain cut for that purpose, and carried over the embankment. The rain which may fall on the surface of the mud land, as well as the spring-water rising therein, is carried off by means of a sluice of three feet by two feet area, composed of the best three-inch oak plank, framed together and supported by piles and cross beams; the bottom of this sluice is on a level with the low-water mark of the highest spring tides.

The land gained is, for the most part, rich argillaceous loam, in many places 20 feet deep, and at present greatly impregnated with marine salt. Nearly one-third of the land has already been ploughed. The abundant rains which in the winter season usually fall in this part of England, and the being enabled to float with fresh water a considerable portion of the new land, lead me to think that

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that by next spring the marine salt will, in a great degree, be extracted, and that in June the land will be fit for sowing. The Secretary of the Board of Agriculture has, upon my application to him, been so obliging as to point out to me the only written detailed accounts of similar experiments, and of the subsequent treatment of the lands acquired. Those details to which he referred me are to be found in Vol. IV. p. 49, of the Transactions of the Society of Arts; in his own Annals of Agriculture, Vol. II. p. 82; and his Norfolk Report, p. 438. As all these accounts concur in stating that the respective new lands have been sown with rape, and also that abundant crops had ensued, it is my intention to sow in June next the greatest part (though probably not the whole) of the land in question with that seed, and I entertain but little doubt of having as favourable crops as those which are mentioned in the papers to which I referred. The Plymouth Road Company having recently, by public auction at Plymouth, sold at the rate of 130*l.* per acre 30 other acres of newly-gained land (called Tolhill Bay), which (with exception that no part of them is yet ploughed, and that the soil itself is considered as inferior to mine) is precisely in the same condition as mine, and nearly about the same distance from Plymouth, I consider that the land which I have gained would, if now offered for sale, produce about 25,000*l.* The expenses of the work have amounted to about 9000*l.* I have also within two years gained, by an embankment from the sea, 40 acres of land at Charlton, near Kingsbridge, in this county, making in the whole 215 acres.

I have the honour to be, Sir,
Your obedient humble Servant,
BORINGDON.

Saltram, Nov. 19, 1807.

To C. Taylor, M. D. Sec.

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The following Certificates of the truth of the foregoing statement, have been received by the Society, with the respective signatures, as annexed.

Nov. 19, 1807.

We hereby certify, that by a map, which we have every reason to think accurate, Chelson Bay contains about 175 acres; that the said bay was, previous to the new embankment, regularly overflowed by the tide of the sea; that the embankment now excludes it from such overflow; that a considerable part of the new land is already ploughed, and that the embankment was begun subsequently to the 1st of January, 1800.

John Harris, Radford.
John Arscott, Clerk, Plympton.
Rev. William Hayne, Minister of Plympton St. Mary's.
R. Williams, Surgeon, Plympton.
E. Start, Pomplett.
T. Norris, Tozer Wixenford.
Isaac Blackburn, Turnchapel.
Richard Worth, Herdwick.

A Certificate, testifying that the tide of the sea overflowed about forty acres of mud land at Charlton, near Kingsbridge, previous to Lord Boringdon's making the new embankment there, and that such embankment now excludes it from such overflow, and that it was begun subsequently to the 1st of January, 1800.

Richard Chaffon.
John Yolland, Merrifield.
William Pearce, Charlton.

The

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The SILVER MEDAL *of the Society was this Session adjudged to* WILLIAM LAWRENCE, *Esq. of Maldon in Essex, for gaining* LAND *from the Sea. The following Communications were received from him, and a Map of the Land is preserved for Inspection in the Society's House.*

SIR,

THE Certificate which accompanies this letter will I believe give you all the particulars necessary for a claim I now presume to make, for gaining land from the sea.

In the summer of 1806, I applied to the Dean and Chapter of St. Paul's, for a lease of the saltings now inclosed, which were part of the demesne lands of their manor of Heybridge Hall, near this town, and which (after they had given their tenant the offer, and he had refused to have them, alledging they were not worth the expense of inclosing) they consented to grant, and have now demised to me, for twenty-one years from Michaelmas last, at the rent of five pounds, renewable every seven years, on payment of a fine, and in the usual form of church leases; and notwithstanding the land is only leasehold, I trust the inclosure will well answer my expectation, although the greatest advantage will be derived by the Dean and Chapter of St. Paul's, for I have not only added near one hundred acres of land to their estate, but by the erection of a new bank or sea wall, they get a foreland to their former estate secured by it, instead of an old rotten bank, which in my opinion was insecure; and the land now leased to me was of little or no value to their tenant.

My

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My first application to them was not for the land now inclosed, but for other saltings very near the town of Maldon, but as they were already promised to another person, with other lands to which they had always been annexed, my wish could not be complied with. It is the prevailing opinion of this neighbourhood, and generally supposed correct, that the stagnated water in the *pans*, as they are called, or holes in the saltings, along with the exhalations from the uninclosed lands, and oose or mud near the river, occasion the agues to which this neighbourhood is subject, and my motive for applying for the saltings near the town, was as much for the benefit of the health of my neighbours as for my own emolument.

It really would be very beneficial if the Dean and Chapter would make some allowance to their tenant, to enable him to embank this piece, for it would greatly improve their property, and benefit the town, to which at present it is a great nuisance; and as the work would be expensive, the tenant cannot be expected to do it without some compensation. I shall in some degree contribute to the health of the neighbourhood by my embankment; but not to the extent I should have done, had a lease of the other part been granted to me.

A plan of the new wall and a map of the land accompany the certificate: you will observe by the latter, that if I could have run the wall across the creek, or the north-east of the land, near Burrow Hills Mill, it would have saved forty rods of walling; but that was not practicable on account of the water which supplies the mill, ebbing and flowing through this creek or channel, at the end of which is a salt office, to which barges laden with rock salt pass and repass, and therefore the navigation could not be stopped.

On

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On the land inclosed are several hills, which are supposed to be Tumuli, thrown up by the Danes after the desperate battle fought here when they invaded this kingdom. These are now intended to be mixed with chalk, and spread on the land as manure.

This land will have an advantage which very few salt marshes possess, as I have now the liberty of diverting a water-course, which will not only supply every part of it, at all times, with good spring-water from Tiptree Heath, but will also fill the ditches of the adjoining lands, which were generally dry in summer.

The whole wall and sluices were completed in ten weeks, although the work was delayed by a very high tide on Christmas-day last, which run over a part of the wall before it was completed, and gullied it in several places; but no material damage was done, although the wall was not so high as at present, by nearly two feet.

The late high tide, on the 30th September last, did not rise to the height of the wall in any part, not even where the rills had been stopped, and where it had sunk considerably, but since raised, although it run over several old embankments in the neighbourhood, inundated the lands, and did much damage in Essex.

I am, Sir, with great respect,

Your obedient Servant,

WILLIAM LAWRENCE.

Maldon, Nov, 2, 1807.

To C. Taylor, M.D. Sec.

We,

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CERTIFICATES.

We, whose names are hereunder written, the Vicar, Churchwarden, and Overseer of the parish of Heybridge, in the county of Essex, hereby certify, that a piece of land, in the parish aforesaid, called the Saltings, containing ninety-nine acres, two roods, and twenty-three poles, has, within the last twelve months, been inclosed by Mr. Wm. Lawrence, of Maldon, from the Black Water river or bay, which is an arm of the sea; and that the land so inclosed is greatly improved thereby, and will shortly become valuable, being well secured from inundation of the sea, by which it has heretofore been overflowed at spring tides.

We further certify, that the embankment is in length two hundred and ninety rods, the base whereof is twenty feet; its height five feet; and the width at the top four feet; the slope on the side next the sea is ten feet, and on the land side six feet; and there is also a good foreland towards the sea. The said embankment is made of soil only, and there are two sluices or gutters under it, which drain the land inclosed. We believe the whole expense of inclosing the said saltings (exclusive of marsh ditches, gates, &c.) to be as follows, viz.

	£.	s.	d.
To 290 rods of walling or embanking, at 1*l.* 6*s.* per rod	370	0	0
To planks, barrows, and tools	50	0	0
To a sluice or gutter, 46 feet long, and 2 feet clear run	51	3	7½
To one do. repaired, 46 feet long, and 18 inches run	28	8	6
To cartage and extra charges	7	18	10
£.	507	10	11½

In

In addition to the above expenses, a considerable sum has been paid for levelling the rills and holes, and in making marsh ditches, gates, &c.

Signed by

FR. J. WARING, A. M. Vicar.
R. FRANCIS, Churchwarden.
RT. CLARK, Overseer.
JAMES SHYNM.
D. P. FRANCIS.

Maldon, Oct. 28, 1807.

SIR,

IN answer to your letter of the 1st instant, I have to inform you, that the embankment is made of soil only, but it is not thrown loosely together, it is composed of the earth which was taken and produced by making a ditch on the land side of the embankment, and from the green sward and soil taken from off the foreland on the sea-side. This earth was thrown together to form the wall or embankment, and after every layer, well rammed or pounded together by the workmen. It was made so firm and consistent as not to have sunk perceptibly, except where some deep creeks and rills were filled up, which are now made good. Since finished, there have been some very high tides, and sometimes a strong surge beating against the embankment, but without doing it the least injury.

I did not sow any grass seeds on the bank when it was finished, because, as it was much impregnated with salt, I considered that it would be scorched up by the summer heat, even if it should begin to vegetate; but as it has now been exposed to the sun and air for a whole summer and winter,

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winter, I intend sowing grass seeds thereon, where there is no herbage already. This is not customary here, for the land is generally left to nature, and frequently many years elapse before a natural green sod is formed, and that is commonly a species of twitch grass. By sowing it with grass seeds, I expect in a year or two to have some good sheep-food upon it. Mr. Waltham, and several gentlemen experienced in works of this kind, have inspected this embankment, and think it exceedingly well done. Six or seven acres of the land thus inclosed were ploughed up early in the last winter, and the quality of the soil appears to be excellent; this part is now sown with black oats, and if the experiment answers, more of the land will be broken up next winter.

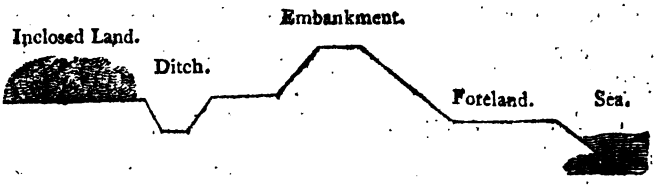
I remain, Sir,

Your obedient Servant,

WM. LAWRENCE.

Maldon, April 4th, 1808.

To CHARLES TAYLOR, M. D. SEC.



The

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The GOLD MEDAL *of*
adjudged to A. BAIN,
for planting 338,199
in Dorsetshire. The
were received from him

SIR,

I BEG leave to inform you,
to make plantations of forest
fleton, in the county of Dor
general, valued at 5s. an acr
1804, I had covered about 5
which are considered to thriv
bourhood. No accurate ac
number and sorts, but makin
of ground, they were planted
those which I shall proceed to
thicker together, and were prob
in the whole 150,000 trees.

Encouraged by my success,
ground, with a bank and ditch
it chiefly with firs. The soil
part not more than two inc
deeper, but of a poor hungry n
heath, or white grass of a bad
or sand. The land had never
more than a shilling an acre,
more. The bank and ditch w
expense of 1s. 6d.; small furz
of the bank at 1s. 8d. per tho

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wards sown to fill up the drills where the plants had failed, or in some places to form a future fence. When the planting was begun, a dead hedge was made on the top of the bank; or fence hurdles, six feet long, and two feet high, were placed on its summit, to prevent the heath sheep, which are active and enterprising, from getting into the plantations before the furze, by its growth, should have completed the security of the fence. Two thousand trees and upwards were allotted to each acre, and the ground was prepared for receiving them in the following manner: A round thin piece of turf, from one and a half to two feet in diameter, was pared off with a sharp spade or an axe-hoe, and thrown away. This small spot of ground, divested of its heath, was then dug and chopped one foot deep with a spade, or if hard and stony, with an axe-hoe, by which the roots of the heath were completely divided; and these little spaces of ground, without taking out any of the earth, were allowed to rot and mellow one or two years before they were filled with plants. This preparation cost little more than a guinea an acre; and, in similar soils, I can recommend it with much confidence. As most of the ground was elevated, and exposed to the strong sea winds of the south coast, which is only four or five miles distant, the planting was begun to the south-west of the whole with Scotch firs, intermixed with some spruce and pinaster, having convinced myself, by repeated trials, that no other trees would succeed so well in that soil and exposure. The firs were raised in my own nursery, or in the immediate neighbourhood, or were procured from Mr. Whitley of Brompton; and in either case, having been transplanted, and allowed to remain at least one season in my own nursery, they and the others were planted out in general at three

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to the Scotch

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every part of my heath, and seems equally regardless of the poverty of the soil, and of the influence of sea winds.

Should the efforts I have made to cover a barren part of the country with trees, entitle me to the honorary premium of the Society, or be deemed worthy of notice in their Transactions, I would take the liberty, through so excellent a medium, to advise the inexperienced planter to receive with caution any recommendation to form plantations of larch on the barren heathy surfaces in the southern counties of England.

I have the honor to be, Sir,

Your obedient humble servant,

A. BAIN.

Curzon Street, Nov. 27, 1807.

P. S. The certificates I have obtained of the present state of the plantation, refer solely to those trees which were planted between the first of October 1804, and the first of April 1805, agreeably to the rules of the Society. But, had it been permitted, I could have brought similar testimony to the state of the trees which were planted later in the year 1805, since which period I have been engaged in planting land of the same description; so that from the year 1798 to the present time, I have planted upwards of 800,000 trees in 400 acres of ground.

Certificates of the truth of the foregoing statement have been received by the Society, signed by

NATHANIEL W. PEACH, Esq. of Dudbridge.
THOMAS BARTLETT, Esq. of Wareham.
RICHARD VINCENT, Gardener to Dr. BAIN, at Heffleton.

The

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The GOLD MEDAL *of the Society was this Session voted to Mr.* CHARLES WAISTELL, *of High Holborn, for his Method of ascertaining the Value of growing Timber Trees, at different and distant Periods of Time. The following Communications were received from him.*

SIR,

CONCEIVING that the Tables contained in the annexed papers will afford useful information to growers of timber, and tend to encourage the growth of it in these kingdoms, and thereby promote the views of the Society of Arts, &c. I trust you will have the goodness to lay them before the Society, as I have formed them with great attention.

Having last autumn viewed some plantations made under my direction about thirty years ago, I found the value of one of them much to exceed my expectation. I became therefore desirous to devise some means of estimating what its value might probably be at different future periods. I was thus led to construct the first of these tables, and on the completion of this, other tables seemed necessary, and I was thus progressively led on to the construction of the whole. For this purpose I searched in various authors for the measure of trees, in girt and height, at different ages, and obtained similar information among my acquaintance. Hence I collected, that the increase in the circumference of trees is generally from about one to two inches annually, and from twelve to eighteen inches the annual increase in height. Some fall a little short, and some exceed those measures.

I shall now briefly notice a few of the advantages to be derived from the first Table.

1st. The first Table shows every fourth year, from twelve years old to an hundred, the rates per cent. per annum at which all trees increase, whether they grow fast or slow, provided their rate of growth does not vary. This table may be the means of saving young thriving woods from being cut down, by showing how great a loss is sustained by felling timber prematurely *.

2d. And it may be the means of bringing old trees to market, by showing the smallness of the interest they pay for the money they are worth, after they are 80 or 100 years old.

But this table shows the interest which they pay, only, whilst the trees continue growing at their usual rate. In case they fall short only a little of their usual increase in girt, this considerably diminishes the rate per cent. per annum of their increase. And trees do decrease in their rate of growth before they appear to do so †. A pale and mossy bark are certain indications of it.

3d.

* "A wood, near West Ward, in Cumberland, of more than 200 acres, was felling in 1794, it was little more than 30 years old. The whole was cut away without leaving any to stand." *See Miller's Gardener's Dictionary, last edition, under the Head of Woods.*

At 30 years old timber pays 10 per cent. for standing, and probably this wood might have paid 7 per cent. per annum on an average for the next 30 years.

† In Mr. Pringle's Agricultural Report for Westmoreland is a paper of the Bishop of Llandaff's, stating, "That a very fine oak, of 82 years growth, measured in circumference at 6 feet from the ground, on the 27th of October 1792, 107 inches, and on the same day of the same month in 1793 it measured 108 inches." He then states the interest it paid to be only about 2 per cent. and says this tree

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3d. The 1st Table may also assist the valuer of such timber as is not to be cut down, but to continue growing, by enabling him to estimate its present value more accurately than is usually done, especially when it is increasing after a high rate per cent. per annum*.

The 2d Table shows the rate per cent. to be the same as in the first Table, though the annual increase is more both in height and circumference.

The 3d Table is calculated to show the number of trees that will stand on an acre of ground, at the distance of one fifth of their height, (which distance is recommended by Mr. Salmon, in a paper in the Society's 24th volume,) and the number of feet the trees will contain, both those to be cut out, and those to be left standing, at the end of every four years, from 16 to 64 years old, supposing they increase 12 inches in height and 1 in circumference annually. This distance may suit fir trees, but will be too near for oaks.

The 4th and 5th Tables show the same particulars when the trees grow at greater rates.

The 6th Table is calculated to show the same particulars when the trees are constantly thinned out every four years, so as to leave them at the distance of one-fourth of their

tree was a singularly thriving one. It is evident that, with all this appearance of thriving, it was on the decline. For if we divide 108, its inches in circumference, by 82, its age, we find its average annual increase had been 1 inch and a third. Its falling off to 1 inch reduced the rate per cent. of increase one-fourth.

* A fir wood of more than 30 acres, and about 30 years old, was lately valued to be sold with an estate, by several eminent wood valuers, without taking into consideration its rate of increase. It was then increasing after the rate of 10 per cent. per annum, and probably would increase after the rate of 8 per cent. on an average for the next 20 years.

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height. According to this table there will be 48 trees left on an acre when they are 120 years old; and it seems generally agreed, that from 40 to 50 full grown oak trees, are as many as have sufficient room to stand on an acre.

The 7th Table shows the same particulars respecting trees which increase 15 inches in height and 1½ inch in circumference annually.

The 8th Table shows the same particulars respecting trees which increase 18 inches in height, and 2 inches in circumference annually.

The 9th Table shows the same particulars as Table 6, till the trees are 28 feet high, after which the distance is increased from one-fourth to one-third of their height.

The 10th, 11th, and 12th Tables show the annual increase in boles of 24, 32, and 40 feet long, and the difference of their increase at the same ages.

To these Tables succeed comparative statements, showing the number of feet contained in boles of different lengths, when the trees are 60 years old; by which it appears, that, if cut down at that age, the longest boles are not the most profitable to the growers of timber.

And I have added the valuation of the plantations before alluded to, with remarks on them.

Having finished my introductory remarks, I conclude, and am, Sir,

Your very humble Servant,

CHARLES WAISTELL.

TABLES

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TABLES RESPECTING THE GROWTH OF TIMBER.

CALCULATIONS, showing every fourth year, from 12 to 100, the progressive annual increase in the growth of trees, and gradual decrease in the rate per cent. per annum, that the annual increase bears to the whole tree.

The whole height of the trees is taken to the top of the leading shoot, and the girt in the middle; but no account is taken of the lateral branches.

If trees increase 12 inches in height and 1 in circumference annually, their increase will be as undermentioned, viz.

TABLE I.

Years old & ft. high	Girt.	Contents.			Years old & ft. high	Girt.	Contents.				One year's increase.				Rate per cent. of increase.
	inch.	ft.	in.	pts.		inch.	ft.	in.	pt.	sds.	ft.	in.	pt.	sds.	
12	1½	0	2	3	13	1⅝	0	2	10	3	0	0	7	3	26·8
16	2	0	5	4	17	2⅛	0	6	4	9	0	1	0	9	19·9
20	2½	0	10	5	21	2⅝	1	0	0	8	0	1	7	8	15·7
24	3	1	6	0	25	3⅛	1	8	4	1	0	2	4	1	13·
28	3½	2	4	7	29	3⅝	2	7	9	1	0	3	2	0	11·
32	4	3	6	8	33	4⅛	3	10	9	6	0	4	1	6	9·67
36	4½	5	0	9	37	4⅝	5	5	11	5	0	5	2	5	8·5
40	5	6	11	4	41	5⅛	7	5	8	10	0	6	4	10	7·6
44	5½	9	2	11	45	5⅝	9	10	7	9	0	7	8	9	6·96
48	6	12	0	0	49	6⅛	12	9	2	3	0	9	2	3	6·36
52	6½	15	3	0	53	6⅝	16	1	10	2	0	10	10	2	5·9
56	7	19	0	8	57	7⅛	20	1	1	7	1	0	5	7	5·4
60	7½	23	5	2	61	7⅝	24	7	6	6	1	2	4	6	5·1
64	8	28	5	4	65	8⅛	29	9	7	0	1	4	3	0	4·76
68	8½	34	1	4	69	8⅝	35	7	8	11	1	6	4	11	4·49
72	9	40	6	0	73	9⅛	42	2	6	4	1	8	6	4	4·2
76	9½	47	7	6	77	9⅝	49	6	5	2	1	10	11	2	3·98
80	10	55	6	8	81	10⅛	57	7	11	9	2	1	3	9	3·79
84	10½	64	3	8	85	10⅝	66	7	7	8	2	3	11	8	3·6
88	11	73	10	4	89	11⅛	76	5	11	1	2	7	7	1	3·5
92	11½	84	5	9	93	11⅝	87	3	4	0	2	9	7	0	3·3
96	12	96	0	0	97	12⅛	99	0	4	6	3	0	4	6	3·15
100	12½	108	6	0	101	12⅝	111	9	6	8	3	3	6	8	3·

In Table X. of the increase of a bole of 24 feet in height, of a tree growing at the above-mentioned rate, it will be observed, that the contents at 24 years of age are the same, and at 64 years nearly the same as in the above Table, but the contents of the bole at all the intermediate periods exceed the above. And a 40 feet bole exceeds the above contents from 44 years to 100, as may be seen in Table 12. For

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For these reasons chiefly I did not think it necessary to take into consideration the decrease in height that takes place in trees at different ages, according to the kind of tree and quality of the soil.

The increase per cent. per annum is the same as the above in all trees at the same age, whether they have grown faster or slower, provided their increase in height and thickness annually has not varied on an average. The progress of trees is sometimes greatly retarded by insects destroying their leaves, by unfavourable seasons, and by their roots penetrating into noxious strata. But these accidents cannot enter into calculations.

CALCULATIONS, showing every fourth year from 12 to 64, the progressive annual increase in the growth of trees, and the gradual decrease in the rate per cent. per annum that the annual increase bears to the whole tree.

The whole height of the trees is taken to the top of the leading shoot, and the girt in the middle; but no account is taken of the lateral branches.

If trees increase eighteen inches in height, and two inches in circumference, annually, their increase will be as undermentioned, viz.

TABLE II.

Age of Trees.	Height	Girt.	Contents.			Age of Trees.	Height	Girt.	Contents.			One year's increase.			Rate per cent. of increas.
	feet.	in.	ft.	in.	pt.		feet.	inch	ft.	in.	pt.	ft.	in.	pt.	
12	18	3	1	1	6	13	19½	3¾	1	5	1	0	3	7	26·5
16	24	4	2	8	0	17	25½	4¾	3	2	4	0	6	4	19·8
20	30	5	5	2	6	21	31½	5¾	6	0	3	6	9	9	15·6
24	36	6	9	0	0	25	37½	6¾	10	2	0	6	2	0	13·
28	42	7	14	3	6	29	43½	7¾	15	10	6	0	7	0	11·
32	48	8	21	4	0	33	49½	8¾	23	4	8	0	0	8	9·6
36	54	9	30	4	6	37	55½	9¾	32	11	7	6	7	1	8·5
40	60	10	41	8	0	41	61½	10¾	44	10	3	6	3	3	7·6
44	66	11	55	5	6	45	67½	11¾	59	3	10	0	3	10	4	0	6·9
48	72	12	72	0	0	49	73½	12¾	76	7	1	0	4	7	1	0	6·3
52	78	13	91	6	6	53	79½	13¾	96	10	11	6	5	4	5	6	5·8
56	84	14	114	4	0	57	85½	14¾	120	6	8	6	6	2	8	6	5·4
60	90	15	140	7	6	61	91½	15¾	147	9	2	0	7	1	8	0	5·
64	96	16	170	8	0	65	97½	16¾	178	9	4	0	8	1	4	0	4·7

Explanation

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Explanation of the Construction of Tables I. and II.

To render the preceding tables easy to be understood by persons not accustomed to calculations, I will state the process of the operations in the first line of Table II.

The height of the tree at 12 years of age is supposed to be 18 feet to the top of its leading shoot, and 24 inches in circumference at the ground, consequently, at half the height, the circumference is 12 inches,—one-fourth of this, being three inches, is called the girt. The girt being squared and multiplied into the height, gives one foot one inch and six parts for its contents. At 13 years old the tree will be 19½ feet high, 26 inches in circumference at the ground, and 13 inches at half the height; one-fourth of 13 gives 3¼ inch for the girt. This squared and multiplied into the height, gives one foot five inches and one part for the contents. Deduct from this the contents of the tree at 12 years of age, and there remains three inches and seven parts, which is the increase in the 13th year. Then reduce the contents of the tree when 12 years old, and the increase in the 13th year, each into parts, dividing the former by the latter, and the quotient will be 3·76; by this number divide 100, and the quotient is 26·5, which is the rate per cent. of increase made in the thirteenth year; consequently whatever the tree might be worth when 12 years old, it will, at the end of the 13th year, be improved in value after the rate of 26*l.* 10*s.* per cent. or in other words, that will be the interest it will have paid that year for the money the tree was worth the preceding year.

At every succeeding period, both in this Table and Table I. the like process is gone through.

Observations

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Observations on Tables I. and II.

The preceding tables furnish us with the following useful information, viz.

1st. That all regular growing trees, measured as above, as often as their age is increased one-fourth, contain very nearly double their quantity of timber.

2nd. That when a tree has doubled its age, its contents will be eight-fold.

3d. That when a tree has doubled its age, the annual growth will be increased four-fold.

4th. Consequently that when a tree has doubled its age, the proportion that its annual increase bears to the contents of the whole tree, is then diminished one-half.

This last observation explains how it comes to pass that a tree, when its age is doubled, the rate per cent. per annum that its increase then bears to the content of the whole tree, is diminished one-half.

It may not be unuseful to observe, that the rate per cent. of increase in the last columns, is the same as the rate per cent. that the increase of the tree that year will pay for the money it was worth the preceding year.

In the two preceding tables, we find that the rate of increase per cent. per annum is the same in both at the same ages, although the quantity of timber in the second table is six times as much as in the first table in trees of all ages; therefore, when the age of a tree is known, the rate per cent. per annum of its increase is known on inspecting these tables, whether the tree has grown fast or slow; provided the growth of the tree has been regular, and that it has continued its usual growth.

And having the age, girt, and height of any tree given, we can readily calculate what quantity of timber it will contain at any future period whilst it continues its usual rate of growth.

A TABLE

A TABLE *showing the Number of Trees to be cut out in thinning of Woods, and the Number left standing at every Period of* 4 *Years from* 20 *up to* 64 *Years.*

In the 24th Volume of the Transactions of the Society of Arts, &c. page 75, Mr. Salmon, in a paper on the Management of Fir Woods, says, "the distance of trees from each other should be one-fifth of their height." At that distance, which is probably sufficient for fir trees, the following will be the number on an acre, and the number to be cut out at the ages and heights under-mentioned, and the number of feet they will then contain in the bole, when measured to the top of the leading shoot. These trees are supposed to increase twelve inches in height, and one in circumference annually, and to have been at first planted four feet apart.

TABLE III.

Years old and feet high.	Girt.	Contents.			Distance.	Number of Trees on an Acre.	Contents of the whole.	Number to be cut out.	Contents
	inch.	ft.	in.	pts.	feet.		feet.		feet.
20	2½	0	10	5	4·	2722	2362	839	727
24	3	1	6	0	4·8	1883	2824	494	741
28	3½	2	4	7	5·6	1389	3308	326	776
32	4	3	6	8	6·4	1063	3779	223	792
36	4½	5	0	9	7·2	840	4252	160	810
40	5	6	11	4	8·	680	4722	118	819
44	5½	9	2	11	8 8	562	5194	90	831
48	6	12	0	0	9·6	472	5664	70	840
52	6½	15	3	0	10·4	402	6130	55	838
56	7	19	0	8	11·2	347	6611	45	857
60	7½	23	5	2	12·	302	7076	37	866
64	8	28	5	4	12·8	265	7537		

And

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And if trees be periodically thinned out to the distance of one-fifth of their height, and that they increase fifteen inches in height, and one inch and a half in circumference annually, the number of trees on an acre, and the number to be cut out at different periods, and the number of feet they will respectively contain at those periods, will be as under, viz.

TABLE IV.

Age.	Hght.	Girt.	Contents.			Distance.	Number of trees on an acre.	Contents of the whole.	Number to be cut out	Contents
years.	feet.	inch.	ft.	in.	pts.	feet.	–	feet.		feet.
16	20	3	1	3	0	4	2722	3402	980	1225
20	25	3¾	2	5	3	5	1742	4246	532	1296
24	30	4½	4	2	7	6	1210	5100	322	1357
28	35	5¼	6	8	4	7	888	5944	208	1392
32	40	6	10	0	0	8	680	6800	143	1430
36	45	6¾	14	2	10	9	537	7644	102	1452
40	50	7½	19	6	4	10	435	8494	75	1464
44	55	8¼	25	11	10	11	360	9355	58	1507
48	60	9	33	9	0	12	302	10192	45	1518
52	65	9¾	42	10	10	13	257	11026	35	1501
56	70	10½	53	7	0	14	222	11895	29	1553
60	75	11¼	65	10	11	15	193	12720	23	1515
64	80	12	80	0	0	16	170	13600		

It will be observed in all these tables, that when trees have doubled their age, there are only one-fourth of the number remaining on an acre, in consequence of their distance being doubled; but as each tree will then have increased its contents eight-fold, therefore the number of feet on an acre must be then doubled. Above, at 64 years of age, there is exactly double the number of feet that there is at 32 years of age.

And

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And if trees be periodically thinned out to the distance of one-fifth of their height, and that they increase eighteen inches in height, and two inches in circumference, annually, the number of trees on an acre, and the number to be cut out at different periods, and the number of feet they will then respectively contain, will be as under, viz.

TABLE V.

Age.	Hght.	Girt.	Contents.			Distance.	Number of trees on an acre.	Contents of the whole.	Number to be cut out.	Contents
years.	feet.	inch.	ft.	in.	pt.	feet.		feet.		feet.
12	18	3	1	1	6	4·	2722	3062	839	943
16	24	4	2	8	0	4·8	1883	5021	673	1794
20	30	5	5	2	6	6·	1210	6302	370	1927
24	36	6	9	0	0	7·2	840	7560	223	2007
28	42	7	14	3	6	8·4	617	8817	145	2072
32	48	8	21	4	0	9·6	472	10069	99	2112
36	54	9	30	4	6	10·8	373	11314	71	2153
40	60	10	41	8	0	12·	302	12583	52	2166
44	66	11	55	5	6	13·2	250	13864	40	2218
48	72	12	72	0	0	14·4	210	15120	32	2304
52	78	13	91	6	6	15·6	178	16294	24	2197
56	84	14	114	4	0	16·8	154	17607	20	2286
60	90	15	140	7	6	18·	134	18843	16	2250
64	96	16	170	8	0	19·2	118	20138		

But if the trees be first planted four feet apart, and be periodically thinned out to the distance of one-fourth of their height, and that they increase twelve inches in height, and one in circumference, annually, the number of trees on an acre, and the number to be cut out at the ages and

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and heights under-mentioned, and the number of feet they will respectively contain in the bole, when measured to the top of the leading shoot, will be as under, viz.

TABLE VI.

Years old & feet high.	Girt.	Contents.			Distance	Number of trees on an acre.	Contents of the whole.	Number to be cut out.	Contents.
	inch.	ft.	in.	pt.	feet.		feet.		feet.
16	2	0	5	4	4	2722	1209	980	435
20	2½	0	10	5	5	1742	1512	532	461
24	3	1	6	0	6	1210	1815	322	483
28	3½	2	4	7	7	888	2115	208	495
32	4	3	6	8	8	680	2417	143	508
36	4½	5	0	9	9	537	2718	102	516
40	5	6	11	4	10	435	3020	75	520
44	5½	9	2	11	11	360	3327	58	536
48	6	12	0	0	12	302	3624	45	540
52	6½	15	3	0	13	257	3919	35	533
56	7	19	0	8	14	222	4230	29	551
60	7½	23	5	2	15	193	4522	23	538
64	8	28	5	4	16	170	4835	20	568
68	8½	34	1	4	17	150	5116	16	545
72	9	40	6	0	18	134	5427	14	567
76	9½	47	7	6	19	120	5715	12	571
80	10	55	6	8	20	108	6000	10	555
84	10½	64	3	8	21	98	6301	8	554
88	11	73	11	4	22	90	6655	8	591
92	11½	84	5	11	23	82	6928	7	591
96	12	96	0	0	24	75	7200	6	576
100	12½	108	6	0	25	69	7486	5	542
104	13	122	0	8	26	64	7811	5	610
108	13½	136	8	3	27	59	8037	4	546
112	14	152	5	4	28	55	8384	4	609
116	14½	169	4	5	29	51	8659	3	508
120	15	187	6	0	30	48	9000	3	562
124	15½	206	10	7	31	45	9309	3	620
128	16	227	6	8	32	42	9557	2	455
132	16½	249	6	8	33	40	9982		

And

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And if the trees be planted at 4½ feet apart, and be periodically thinned out to the distance of one-fourth of their height; and that they increase 18 inches in height and 2 inches in circumference annually; the number of trees on an acre, and the number to be cut out at the different periods under-mentioned, and the number of feet they will then respectively contain, will be as under, viz.

TABLE VIII.

Age.	Height.	Girt.	Contents.			Distance	Number of trees on an acre.	Contents of the whole.	Number to be cut out.	Contents.
Years.	feet.	inch.	feet.	in.	pts.	feet.		feet.		feet.
12	18	3	1	1	6	4·5	2151	2419	941	1058
16	24	4	2	8	0	6·	1210	3226	486	1162
20	30	5	5	2	6	7·5	774	4031	237	1234
24	36	6	9	0	0	9·	537	4833	142	1278
28	42	7	14	3	6	10·5	395	5645	93	1329
32	48	8	21	4	0	12·	302	6442	63	1344
36	54	9	30	4	0	13·5	239	7249	46	1395
40	60	10	41	8	0	15·	193	8041	33	1375
44	66	11	55	5	6	16·5	160	8873	26	1441
48	72	12	72	0	0	18·	134	9648	20	1441
52	78	13	91	6	6	19·5	114	10435	16	1464
56	84	14	114	4	0	21·	98	11201	12	1372
60	90	15	140	7	6	22·5	86	12093	11	1546
64	96	16	170	8	0	24·	75	12800		

It is difficult in thinning plantations to leave the trees at nearly equal distances. The distances stated in all these tables must be considered the average distances. If, for instance, there be 302 trees on an acre, their average distance will be 12 feet, although few of them may stand at exactly that distance.

If

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If the trees be first planted 4 feet apart, and be periodically thinned out to the distance of one-fourth of their height until they are 28 feet high, and to one-third of their height afterwards, and that they increase 12 inches in height and one in circumference annually, the number of trees on an acre, and the number to be cut out at the ages and heights under-mentioned, and the number of feet they will then respectively contain in the bole, when measured to the top of the leading shoot, will be as under, viz.

TABLE IX.

Years old and feet high.	Girt.	Contents.			Distance	Number of trees on an acre.	Contents of the whole.	Number to be cut out.	Contents.
	inches.	feet.	in.	pts.	feet.		feet.		feet.
16	2	0	5	4	4	2722	1209	980	435
20	2½	0	10	5	5	1742	1512	532	461
24	3	1	6	0	6	1210	1815	322	483
28	3½	2	4	7	7	888	2115	453	1078
30	3¾	2	11	1	10	435	1271	133	388
36	4½	5	0	9	12	302	1528	80	404
42	5¼	8	0	5	14	222	1783	52	417
48	6	12	0	0	16	170	2040	36	432
54	6¾	17	1	0	18	134	2289	26	444
60	7½	23	5	2	20	108	2530	18	421
66	8¼	31	2	4	22	90	2807		

Observations on Table IX.

On examining several oak woods, it appeared to me, that the distance of one-third of their height was not too much where the trees were from 30 to 40 feet high and upwards.

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I have therefore calculated a table according to the distance of one-fourth of their height, till they are 28 feet high, and according to the distance of one-third of their height afterwards.

The timber to be thinned out before the age of 28 years, will be the same as in Table VI. but at 28 years of age there are 583 feet more to be cut out according to this Table than at the same age in Table VI.; there will however be less to be cut out between the ages of 28 and 60 years of age. But if the trees in this Table, in consequence of having more room, were to increase $1\frac{1}{4}$ inch in circumference annually, instead of 1 inch after they are 28 years of age, the produce of an acre at 60 years of age would equal the produce stated in Table VI. at the same age; taking into consideration that the value of the 583 feet excess cut out at 28 years of age would then be more than quadrupled, if the money were placed out at 5 per cent. compound interest. A considerable additional increase in circumference may certainly be expected, in consequence of the trees having almost double the room in which to extend their branches, and for the admission of those powerful agents, sunshine and air.

Observations on the Tables respecting the Thinning of Woods, and their Produce.

Mr. Salmon is the only person I know of, who has given a general rule for thinning plantations. But as I conceive his distance of one-fifth of their height would leave oaks too close, especially after they had acquired a sufficient length of stem, I have calculated both on his plan, which is proper for fir trees, and also at greater distances.

The

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The preceding Tables VI. VII. and VIII. are calculated on a supposition that the trees are never suffered to stand nearer, on an average, than one-fourth of their height; and although the quantities of timber thinned out and left standing on the ground at that distance, at the end of 60 years, be only two-thirds of the quantity according to Mr. Salmon's distance, yet I suppose it will be generally thought an ample produce and sufficiently encouraging.

According to Table VI. which is calculated for oaks, the first thinning is at sixteen years old, and the second at twenty, but it is the advice of an eminent planter, (Mr. Pontey,) to begin thinning at about thirteen years old, according to the state of the trees, and to cut out about 150 poles per acre annually, for the next seven years. Without putting any value upon the thinnings before 20 years old, we find that at the 20th and 24th years, the thinnings measure 945 feet, the value of which, at a low estimate, will be sufficient to repay the rent and taxes, of ground of a moderate quality, the expense of plants, planting, and after-management, calculated at 5 per cent. compound interest.

When 28 years old, and at the end of every fourth year following, up to 120, the trees to be cut out of an acre will measure from 495 to 550 feet; but say 500, at 4*s.* a foot, on an average, including the value of the bark; this gives 100*l.* which sum divided by 4, leaves 25*l.* for the produce per acre per annum. This deserves the consideration of those who are inclined to convert young woods into coppices, without leaving a reasonable number of standards.

It may however be said, that as the trees cut out in thinning plantations are the bad thrivers and underlings, their contents will be less than the average; but, if we take their

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value at one-half the above estimate, that is, after the rate of 12*l.* 10*s.* per acre per annum at 28 years of age and upwards, even this produce must be thought ample, together with the value of the trees left standing.

Table VI. was constructed chiefly with a view to oaks, their annual increase in circumference varying from $\frac{3}{4}$ of an inch to $1\frac{1}{4}$ inch, the medium of which is 1 inch.

Tables VII. and VIII. were calculated for ash, elm, sycamore, firs, poplars, and other woods of swift growth, their increase in circumference being generally from $1\frac{1}{2}$ to 2 inches annually. If ash trees be found to increase after the rates of Table VII. or VIII. they must be exceedingly profitable, at the high prices now given for that timber. Many other observations might be made on Tables VII. and VIII. but these will readily occur to persons interested in quick growing trees.

An acre of trees increasing after the rate of Table VI. produces in 64 years little more than half the number of feet that another acre produces which increases after the rate of Table VII. and little more than one-third of another, increasing after the rate of Table VIII. in the same time.

In planting with a view to profit, the first object is a long, straight, and clear stem. This is most certainly and speedily obtained by thick planting at first, and not thinning too soon. A kind of competition among the trees is thereby occasioned, each struggling, as it were, to outgrow its neighbour, in search of light, heat, air, and moisture.

This competition must, however, be judiciously moderated by timely thinning; always keeping the trees sufficiently strong in the stem. If they be suffered to stand some years too near each other, their stems will become weak, and bend under their small tops when thinned.

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Where this has taken place in only a small degree, they will make but little progress for some years afterwards.

By the time the trees have advanced to 24 or 30 feet high this competition should cease, if they are intended to be cut down at or before 60 years of age, and they should then be encouraged to extend their tops more in width than in height, strong side branches being apparently quite as conducive as the leading shoot, to the vigorous growth of the bole below them. After this period, the best rule for thinning will probably be, to leave a clear space around the top of each tree, in which the branches may extend themselves without obstruction. A tree whose top is 20 feet diameter, receives four times the benefit from air, rain and dew as another does whose top is only 10 feet diameter.

The trees in the interior of young woods are smaller in their boles than the exterior trees. And in a fine oak wood, of about 40 acres, divided into squares by several avenues or ridings crossing each other at right angles, I observed the rows of trees next the avenues much thicker in their boles than the trees in the interior of the squares; owing, no doubt, to their having more and larger branches in consequence of their having more room, although it is only on one side.

Being too parsimonious of ground seems to me a great and very general error. If the same number of trees of 32 feet high and upwards, in Table VI. were allowed the space of two acres instead of one, and, in consequence of their standing thinner, were to increase annually only the fiftieth part of an inch more in girt than they would do if they stood on one acre, this small additional increase in girt would pay an ample rent for the additional acre.

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In the year 1791 a paper of Observations on the Propagation and Management of Oak Trees in general, but more particularly applying to his Majesty's New Forest in Hampshire, was published by T. Nichols, Purveyor of the Navy for Portsmouth Deck-yard.

In this paper it is said, that "there are to be seen in many parts of the forest from 40 to 50 fine oaks standing on an acre that will measure one with another two loads a tree."

"Several woods in the forest are almost ruined for want of thinning, and its being done at proper times; particularly the inclosures that were made in the year 1700; —these were originally well planted, and great numbers of trees brought up in them, which now remain so close together that they are nearly stagnated, particularly in Salisbury, Trench, Brimley Coppice, and Woodfidley; and, although it is 90 years since they were planted, the trees will not measure, one with another, above six or seven feet a tree; whereas, if the business of thinning had been done as it ought, the remaining trees (after drawing much useful timber) would by this time have been of a size nearly fit for naval uses, as in some of the woods that were planted at the same time, the trees which have had room to expand, and a free air admitted to them, will measure from 70 to 80 feet."

Observations on the Growth of Timber.

The rings observable in the transverse section of a tree at its but-end, are the same in number as the years of its age; an additional ring being produced annually, in consequence of the annual rising of the sap. The rings are nearly concentric

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tric in trees that have grown in the interior of close shady woods, but eccentric in others, being of different breadths on the northern and southern sides of such as have grown single, or in any other situation where their boles have been much exposed to the rays of the sun. This difference is occasioned by the different degrees of heat to which the opposite sides of the boles of trees are exposed. And, indeed, we find these rings are always broadest on that side of the bole or stem most warmed by the sun. Hence we see the utility of exposing their boles as much as possible to its rays*. It is often seen in the stumps of trees that have stood single, that they have grown nearly twice as fast on the southern side as on the northern, their pith being so much nearer to the northern side.

It is, however, to be remarked, that the wood from that side of a tree which has grown the slowest, is heavier than from the opposite side which has grown the fastest, and it is probably stronger in the same degree.

It may be worth the consideration of those who have southern hangs or declivities to plant, whether to plant, or rather leave the trees in thinning, in double rows in lines running east and west, at about fourteen or sixteen feet distance, and the double rows at about thirty-six feet distance, less or more, according as the declivity is more or less, in order that their boles may receive the greatest possible benefit from the direct rays of the sun.

No doubt many gentlemen are in possession of facts that

* On a hot day in the middle of May I have observed the mercury in the thermometer to rise and fall from twelve to sixteen degrees, on hanging it alternately on the sunny and shady sides of the same tree, between the hours of two and five o'clock, at which time of the day the heat is generally the greatest.

would

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TABLES *showing the Increase of* BOLES *of* TREES *of different Lengths.*

If a tree has increased twelve inches in height and one in circumference annually, until it is twenty-four years old, it will then be twenty-four feet high, and three inches girt at twelve feet high; and supposing that in process of time this tree be pruned up so as to leave the bole twenty-four feet high clear of branches, and that it continue increasing one inch in circumference annually, the rate per cent. per annum of its increase will be as under, exclusive of the increase of timber in its top and lateral branches.

TABLE X.

Years old.	Girt.	Contents.			Years old.	Girt.	Contents.			One year's increase.			Increase per cent. per annum.
	in.	ft.	in.	p.		in.	ft.	in.	p.	ft.	in.	p.	
24	3	1	6	0	25	3¼	1	9	1	0	3	1	17·1
28	4	2	8	0	29	4¼	3	0	1	0	4	1	12·7
32	5	4	2	0	33	5¼	4	7	1	0	5	1	10·1
36	6	6	0	0	37	6¼	6	6	1	0	6	1	8·4
40	7	8	2	0	41	7¼	8	9	1	0	7	1	7·2
44	8	10	8	0	45	8¼	11	4	1	0	8	1	6·3
48	9	13	6	0	49	9¼	14	3	1	0	9	1	5·6
52	10	16	8	0	53	10¼	17	6	1	0	10	1	5·04
56	11	20	2	0	57	11¼	21	1	1	0	11	1	4·5
60	12	24	0	0	61	12¼	25	0	1	1	0	1	4·1
64	13	28	2	0	65	13¼	29	3	1	1	1	1	3·8
68	14	32	8	0	69	14¼	33	10	1	1	2	1	3·5
72	15	37	6	0	73	15¼	38	9	1	1	3	1	3·3
76	16	42	8	0	77	16¼	44	0	1	1	4	1	3·1
80	17	48	2	0	81	17¼	49	7	1	1	5	1	2·9
84	18	54	0	0	85	18¼	55	6	1	1	6	1	2·7
88	19	60	2	0	89	19¼	61	9	1	1	7	1	2·6
92	20	66	8	0	93	20¼	68	4	1	1	8	1	2·5
96	21	73	6	0	97	21¼	75	3	1	1	9	1	2·3
100	22	80	8	0	101	22¼	82	6	1	1	10	1	2·2
120	27	121	6	0	121	27¼	123	9	1	2	3	1	1·8
140	32	170	8	0	141	32¼	173	4	1	2	8	1	1·5
160	37	228	2	0	161	37¼	231	3	1	3	1	1	1·3

But

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But if a tree increase 12 inches in height and one inch in circumference annually, until it be 32 feet high, and in process of time the bole be pruned up to that height, the rate per cent. per annum of the increase of this bole will be as under, exclusive of the increase in its top and lateral branches.

TABLE XI.

Years old.	Girt.	Contents.			Years old.	Girt.	Contents.			One year's increase.			Increase per cent. per ann.
	inch.	ft.	in.	pts.		inch.	ft.	in.	pts.	ft.	in.	pts.	
32	4	3	6	8	33	4¼	4	0	2	0	5	6	12·9
36	5	5	6	8	37	5¼	6	1	6	0	6	10	10·25
40	6	8	0	0	41	6¼	8	8	2	0	8	2	8·5
44	7	10	10	8	45	7¼	11	8	2	0	9	6	7·3
48	8	14	2	8	49	8¼	15	1	6	0	10	10	6·3
42	9	18	0	0	53	9¼	19	0	2	1	0	2	5·6
56	10	22	2	8	57	10¼	23	4	2	1	1	6	5·06
60	11	26	10	8	61	11¼	28	1	6	1	2	10	4·59
64	12	32	0	0	65	12¼	33	4	2	1	4	2	4·2
68	13	37	6	8	69	13¼	39	0	2	1	5	6	3·68
72	14	43	6	8	73	14¼	45	1	6	1	6	10	3·6
76	15	50	0	0	77	15¼	51	8	2	1	8	2	3·36
80	16	55	10	8	81	16¼	58	8	2	1	9	6	3·1
100	21	98	0	0	101	21¼	100	4	2	2	4	2	2·39
120	26	150	2	8	121	26¼	153	1	5	2	10	9	1·92

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high, with few and small lateral branches: and at sixty years old, the former will have had to increase in the last twenty-eight years, only one quarter of an inch in girt, more than the latter, to exceed it in measure, to say nothing of the excess of timber in the larger top and branches. It must, however, be remarked, that at eighty years of age, the forty feet bole will exceed the thirty-two feet bole nearly six feet; and at one hundred years, thirteen feet, provided it swell equally fast in thickness. But unless the trees be oak, fit for the use of the navy, for which an increased price can be had, I imagine few gentlemen would now choose to let their trees stand to eighty years of age, when the increase of their boles will not be four per cent.; still fewer would let them stand to one hundred, when the increase will not be three per cent. per annum.

Again, let it be supposed that trees sixty years of age have increased annually, during their growth, fifteen inches in height, and one inch and a half in circumference, the girt and contents of their boles, if of the under-mentioned lengths, will be as under, viz.

							Contents. F.	i.	p.
Trees with	20	feet boles, will be	19½	inches girt at	10	feet high,	52	9	9
Do.	25	do.	18½	do.	12½	do.	61	0	5
Do.	30	do.	18	do.	15	do.	67	6	0
Do.	40	do.	16½	do.	20	do.	75	7	6
Do.	50	do.	15	do.	25	do.	78	1	6

Taking it for granted that the shorter boles will increase faster in thickness than the longer ones, it is reasonable to expect that the forty feet bole will contain more timber than the fifty feet bole when they are both sixty years old; and if they are both sold at the same rate per foot, the forty feet

feet bole must consequently be more valuable. If, however, a higher price can be had for longer boles, this may compensate not only for their deficiency in measure at sixty years of age, but also for their standing beyond the period when they cease paying the common rate of interest for the money they are worth, which I suppose is frequently the case as to tall elm trees, fit for keel pieces, and perhaps beech for ship planking. It is hence evident, that where the soil is such as will enable trees to grow to a great height, it will be necessary, before we decide how high to prune them, to consider to what purposes the timber can be most advantageously appropriated.

Whatever the lengths of the boles of trees increasing as above may be, their increase is five per cent. per annum, one year after their girt in the middle is 15 inches, but not longer.

Again, let it be supposed that trees sixty years of age have increased annually, during their growth, eighteen inches in height, and two inches in circumference, the girt and contents of their boles, if of the under-mentioned lengths, will be as under, viz.

							Contents. F.	I.	P.
Trees with	24	feet boles,	will be	26	inches girt at	12 feet high,	112	8	0
Do.	30	do.		25	do.	15 do.	130	2	6
Do.	36	do.		24	do.	18 do.	144	0	0
Do.	48	do.		22	do.	24 do.	161	4	0
Do.	60	do.		20	do.	30 do.	166	8	0

Here again we may suppose that the forty-eight feet bole, by swelling faster than the sixty feet bole, may exceed it in measure at sixty years of age, and this it would do, were the girt increased only half an inch. And if the thirty-six feet bole was increased two inches in girt, it would exceed

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both the forty-eight and sixty feet boles. But trees of such swift growth are frequently cut down before they are sixty years old. At forty years of age the thirty-six feet bole, if it swell no faster than the forty-eight feet bole, will contain more timber if measured according to the present erroneous method. (The greater disproportion there is between the two ends of a piece of timber, and the more disadvantageously it measures, when the girt is taken in the middle.) I suppose that in timber of this swift growth, the longer boles are frequently not worth more per foot than the shorter boles; therefore, in this case, that length of bole should be fixed on which is likely to measure most at the period when the trees are intended to be felled.

Whatever the lengths of the boles of trees increasing as above may be, their increase is five per cent. per annum, one year after their girt in the middle is 20 inches, but not longer.

It appears from the last observations and calculations, that the annual increase in the boles of trees by their growth, ceases to be equal to five per cent. per annum some time between forty-six and sixty years of age, according as the boles are shorter or longer.

But it being generally allowed that oak trees, of a size fit for the navy, require to grow from eighty to one hundred and fifty years, according to the quality of the soil, and it is so stated in the eleventh report of the commissioners appointed to inquire into the state and condition of the woods, forests, and land revenues of the crown; I have therefore been calculating tables, showing what the proportionably advanced prices should be, at different periods, up to one hundred and fifty years, to pay the proprietors for letting their trees stand to those periods. These prices, especially at

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at the later periods, very greatly exceed any that have ever been given. It certainly has been much the interest of the growers of oak timber to fell it at about sixty years of age, even if they replant the same ground. To let it stand to one hundred and twenty years of age, and sell it at the present prices, their loss would exceed double the whole value of the timber at sixty years of age. Nothing short of a sufficient price will long command a sufficient supply. Owing to too low prices the quantity of large timber on private estates has long been rapidly decreasing; and it will be too late to commence offering reasonable prices for it when it is all gone, and no oaks left of greater growth than sixty years. To have to wait their growing the second sixty years, may bring upon us evils exceeding all calculation.

Valuations made in October, 1807, of several Plantations in Staffordshire.

The valuations were made of the trees growing within the space of a chain square, being the tenth part of an acre, of the medium growth of each plantation.

In the plantation by the mill wall there are now growing within twenty-two yards square, as under, viz.

	£.	s.	d.	£.	s.	d.
70 oak trees, containing 175 feet, at 2*s.* 3*d.*	19	13	9			
1200 of oak bark, at 12*s.*	7	4	0			
	26	17	9	or, per acre, 268	17	6

The above is part of about four acres planted in 1775, on a strong loamy soil, worth about 20*s.* an acre.

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	£.	s.	d.
One pound per ann. forborn 32 years, and improved at 5 per cent. compound interest, would amount to	75	6	0

But the value of the timber is more than three times this amount.

The ground was prepared for planting by ploughing.

On the east side of Cottage Wood there are now growing, within twenty-two yards square, as under, viz.

	£.	s.	d.		£.	s.	d.
50 ashes, containing 300 feet, at 1s. 6d.	22	10	0				
13 oaks do. 7 do. 2s.	0	14	0				
Bark	0	7	0				
	23	11	0	or, per acre,	235	10	0

The above is part of about two acres planted in 1776, partly on heaps of earth in clay pits, and partly on strong soil upon a deep bed of sand, value about 15s. an acre.

	£.	s.	d.
Fifteen shillings per annum, forborn 31 years, and improved at 5 per cent. compound interest, would amount to	53	0	0

But the value of the timber is more than four times this amount.

In the clay pits only holes were dug for the plants, but the other part wholly trenched, or double dug with the spade.

In Pickmore Pool Plantation there are now growing, within twenty-two yards square, as under, viz.

	£.	s.	d.		£.	s.	d.
97 Scotch firs, containing 636 feet*, at 1s.	31	16	0	or, per acre,	318	0	0

* This produce is after the rate of 6360 feet an acre, which is about the rate of Table IV.

The

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The last plantation is part of about six acres planted in the springs of 1778 and 9. Much of the soil is a tough peat on gravel or hungry white sand, worth, say 5*s.* per acre.

This ground laid between two tenants who had never cultivated it. They had then nineteen years unexpired of their lease of thirty-one years of this and the adjoining lands, and willingly gave it up to be planted, on condition of having the fences made and kept in good repair.

	£.	s.	d.
Five shillings a year, forborn 29 years, and improved at 5 per cent. compound interest, would amount to	15	11	0

But the value of the timber is more than twenty times this amount.

The trees were about two feet high, and planted at two yards distance, in holes dug with the spade, 1210 on an acre. Labour of making the holes and planting the trees cost 1*l.* 6*s.* 10½*d.* per acre.

About 2700 were planted on an acre in the other plantations, where the ground was wholly broken up.

In the remarks on these three plantations, no notice is taken of the thinnings. I am informed by gentlemen who have kept accounts of thinnings, that these have repaid the rent of the land and every expense, with compound interest, some time before the woods were thirty years old; and the preceding calculations show that it may be so. And if so, the present value of these plantations is all clear gain.

The valuer of these plantations has bought a good deal of wood out of them; and the prices he has valued at per foot, may possibly be a fair value there for such small timber.

The growth of the firs in the last-mentioned plantation, is probably as great in that poor ground as it would have

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been had they been planted on ground of three or four times its value; this must be a powerful inducement to gentlemen to plant all such poor ground in the first instance.

And a few of oaks, ashes, and firs, may be raised on almost every farm in screens, that may, by their shelter, increase the value of the farm to the occupier, by increasing the produce, particularly that of grass grounds. In this case the interest of landlord and tenant may be reciprocal; but it is the reverse where trees are planted in hedge-rows.

And even the sides and tops of high mountains may be made abundantly more productive of grass, if certain portions of them were surrounded by plantations. These plantations, by breaking the force of cold winds, diminish their chilling effect on the fields the plantations surround, and render the climate on mountains much more mild and genial.

This last kind of improvement will generally be found very greatly to exceed the expectation of the improver, provided it be judiciously planned and executed.

May I take the liberty to suggest, that information of very great value might be obtained by the Society from the gentlemen to whom medals and premiums have been given for planting trees, if they would favour the Society with their subsequent observations respecting those plantations.

It would, for instance, be desireable to have the nature of the soil and under strata described,—the sorts of trees best suited thereto,—the distance at which the trees were first planted,—at what periods they were thinned, and how many cut out at each thinning, and their measure and value,—the present height, distance, measure, and value, of the trees now growing on an acre—what distances are found

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found most advantageous, and also the best height to be pruned.

The fund of information that such communications might afford, would prove of very great value indeed to future planters, as well as to many proprietors of plantations of different ages now growing.

If the Society should think it adviseable to solicit this information, no doubt the ample and valuable materials they would thereby obtain, would enable some abler pen to do justice to the curious and important subjects of the preceding pages. In the mean time it is hoped, that this attempt to reduce our knowledge of the growth of timber to something like system, however imperfect it may be, will be received with indulgence. Assuredly, it had not so soon seen the light, had not the present situation of our country imperiously demanded of every individual his utmost exertion to render us as independent as possible of supplies of every kind from the continent of Europe, from which we are now almost totally excluded.

C. WAISTELL.

High Holborn, March 15, 1808.

To CHARLES TAYLOR, M. D. SEC.

The GOLD MEDAL *of the Society was this Session voted to* JOHN CHRISTIAN CURWEN, *Esq. M. P. of Workington-Hall, Cumberland, for his Improvements in the* CULTURE OF VEGETABLES. *The following Communications were received from him.*

SIR,

I AM fearful you should suppose that I am become indolent, and that the favours so liberally bestowed on me by

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the Society, had ceased to operate as a stimulus to the further exertions of my humble endeavours to assist those objects which, by the fostering hand of the Society, have been so essentially promoted. You will excuse me for wishing to assure you that I am not idle, and to inform you that the objects which at present employ me are, I conceive, of great importance to agriculture.

The first is by experiments to ascertain the best and most productive mode of applying manure. The second is to determine whether the distances between the stitches in drill husbandry may not be greatly enlarged, without any diminution of crop.

I am strongly inclined to believe that where the ground is laid dry, that manure can scarcely be deposited too deep; by so doing the evaporation is retarded, and consequently the manure continues for a greater length of time to furnish nourishment to the crop.

The increase of the distances between the stitches, permits the power of continuing the operations of turning up the soil to a more extended period, which not only improves the tilth, but furnishes a greater degree of moisture by exhalation, than can be yielded from ground in that state of hardness it soon acquires when undisturbed in summer. This evaporation is prodigious, though not perceptible to the eye: it is, however, fully demonstrated by a very ingenious experiment of the Bishop of Llandaff; and I am anxiously expecting to form such conclusions from trials I am engaged in respecting its effects on vegetation, as may deserve the consideration of the Society.

My former objects of feeding cattle with potatoes, supplying milk to the poor, &c. are pursued with increased success.

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success. The use of potatoes as a food for horses and cattle increases daily.

I am, dear Sir,

Your faithful and obedient Servant,

J. C. CURWEN.

Tibetson's Hotel,
London, April 21st, 1807.

To CHARLES TAYLOR, M. D. SEC.

DEAR SIR,

IT is with great satisfaction that I have the honor of again submitting the result of my farming operations to the consideration of the Society of Arts. Deeply impressed with a sense of the many favors conferred upon me by them, I have found myself impelled, both by gratitude and inclination, to proceed with redoubled exertion, as the best return in my power.

The liberal patronage and encouragement bestowed on agriculture by the Society, has powerfully contributed to awaken the country to a just estimation of its importance, as the basis of individual happiness and national prosperity; and at this moment the empire owes its preservation and security to it.

I submit with great deference the result of my recent operations. I am disposed to flatter myself that they may lead to important consequences and discoveries, highly beneficial to agriculture. The experiments I have made tend to establish the double advantage of well cleaning and working the ground. First, as it frees the land from weeds; and secondly, as it conduces to the growth of the crop. It affords

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affords likewise a very strong demonstration in favour of using manure in its freshest state, by which not only the great usual expense of making dunghills will be saved, but the manure made to extend to the improvement of a third more land.

Most of the farm I occupy was in that state of foulness as to require, according to general practice and opinion, a succession of fallows to clean it. Being unwilling to adopt a system which is attended with such loss, I determined to attempt to clean a part of it by green crops, and for such purpose to allow a much greater distance between the stitches than had ever been in practice. My first experiment on this plan was made on a crop of cabbages; they were planted in a quincunx form, allowing four feet and a half between each plant, in order to allow room for the plough to work in all directions. I adopted this plan of field husbandry, as affording the greatest facility in cleaning the crop, though I believe it never was before so practised. Two thousand three hundred and fifty plants were set per acre (eight thousand is not unusual in the common method), and each plant had, by computation, an allowance of a stone of manure, or less than fourteen tons per acre; though the common quantity is generally from thirty to forty tons per acre. The manure was deposited as deep as the plough could penetrate, drawn by four horses, and the plant set directly above it.

The plough and harrow constructed to work betwixt the rows, were constantly employed during the summer, and the ground was as completely freed from weeds as it could have been by a naked fallow. The very surprising weight of my crop, which in October was thirty-five tons and a half per acre, and many of the cabbages fifty-five pounds each,

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feet endways. On each acre there were 1230 beds, and 6150 sets, or five to each bed, viz. one at each corner, and one in the middle. The sets of potatoes, when planted according to the usual most approved practice, in three feet stitches, and nine inches apart, amount to about twenty thousand. In the present, and indeed in all seasons when potatoes are scarce, the saving in planting is a considerable object. A great advantage also arises in being able to keep the potatoes and manure from wet. In the late uncommonly wet season I sustained little or no loss in my mode, which was not the case in many of the driest grounds. This plan unites hand hoeing with horse culture, and will be found serviceable in wet soils.

The lateness of planting, together with the premature frosts, prevented my forming a fair judgment as to the quantity per acre which might be obtained by this method. My view in fixing upon this plan was, to enable me to judge of the effects of evaporation, by being able to continue my operations for a longer period. I have no doubt but that in common seasons, notwithstanding the increased distance, the whole ground would be covered.

My experiments on cabbages this season commenced by planting them early in April. From the rain which fell subsequently, and continued till the beginning of May, succeeded by severe east winds, the earth became so hard and baked, that the plants had made very little progress.

In the first week in June the ploughs were set to work: as they started, Mr. Ponsonby of Hail Hall was present, and saw the crop; it was with difficulty that the ground was first broken, but by the end of the week it was brought into fine tilth. Notwithstanding the whole week had been dry, with a strong sun and severe east wind, yet such was the

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the progress in growth of the cabbages, that when seen again by that gentleman on the Saturday, he could scarce be persuaded they were the same plants.

During these operations I had been making constant experiments with glasses, contrived for the purpose, to ascertain the quantity of evaporation from the land, which I found to amount, on the fresh ploughed ground, to nine hundred and fifty pounds per hour on the surface of a statute acre, whilst on the ground unbroken, though the glass stood repeatedly for two hours at a time, there was not the least cloud upon it, which proved that no moisture then arose from the earth.

The evaporation from the ploughed land was found to decrease rapidly after the first and second day, and ceased after five or six days, depending on the wind and sun. These experiments were carried on for many months. After July the evaporation decreased, which proves that though the heat of the atmosphere be equal, the air is not so dense. The evaporation, after the most abundant rains, was not advanced beyond what the earth afforded on being fresh turned up. The rapid growth of my potatoes corresponded perfectly with the previous experiments; and their growth in dry weather visibly exceeded that of other crops where the earth was not stirred. The component parts of the matter evaporated remain yet to be ascertained; the beneficial effects arising from it to vegetation cannot be doubted or denied, but whether they proceed from one or more causes, is a question of much curiosity and importance.

May not a similar process here take place, as when water is exposed to the action of the air in irrigation? Is it too much to suppose some natural operation to take place in the earth, which may decompose the oxygen contained in air

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air from the hydrogen, during the absence of the sun; which on the sun's re-appearance may be again given out in a state highly propitious to vegetation? Oxygen is found to contain carbon; and may not the growing plants imbibe it from the air, and may we not thereby account for its forming a constituent part of all vegetables?

The investigation of these objects presents a wide field for inquiry, and may lead to very important discoveries. From more or less oxygen contained in the earth, may not its proportions account for the fertility of one soil above another? May not the advantages supposed to be derived from loosening the soil, proceed from its being thus rendered in a fit state to imbibe the air? Fallows soon become so hard upon the surface, as neither to be capable of absorption or evaporation. One very important result is placed before the eyes, and within the reach of every practical agriculturist to ascertain, namely, that the evaporation from dung is five times as much as from earth, and is equal on the surface of an acre to 5000 pounds per hour. By making use of dung in its freshest state, the farmer may extend his cropping to one third more land with the same quantity of manure. It is with regret that I have viewed, in many parts of the kingdom the quantity of manure which is exposed on the surface, and tends to no good. I am strongly of opinion that in all light soils, if the manure was buried in trenches as I propose, and the turnips sowed above it, that more abundant crops would be procured. By cleaning with the plough, great advantage would be derived to the crop, from the evaporation yielded by the earth. Hot manure might also be used. By fermentation dung is reduced to one half its bulk, and its quality reduced in a much greater proportion. The manure now commonly

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ordered Mr. Blunt, optician, of Cornhill, to construct him an instrument for ascertaining the evaporation, which instrument I shall request Mr. Blunt to show to the Society. Mr. Young intends in the course of the summer to make a variety of experiments on the quantity of evaporation produced from different soils, agreeing with me, that the greater or less degree of it influences most materially the luxuriance or growth of the crop.

In all the valuable tracts which Mr. Young has given to the world, he has never adverted to this, and the first knowledge of it as a principle for promoting the growth of crops, was obtained from my account of the Schoose Farm, in the report of the Workington Agricultural Society, of which he is a member.

Being unable to account for the surprising weight of my first crop of cabbages, with only one-third of the manure usually given, I was led to make the experiments I have laid before the Society; and I believe I am not only the first person in Lancashire, but even in Great Britain, who ever thought of ploughing the ground upon the principle I have executed, for promoting the growth of the crops. I flatter myself that my experiments on the economical application of manure, will lead in a high degree to facilitate a more extended cultivation, and obviate the objections which have been started by some persons against the inclosure of waste lands, from their supposition that manure could not be furnished for more than the land at present cultivated. I remain, dear Sir,

Your obedient Servant,

J. C. CURWEN.

Ibbetson's Hotel, Vere-street,
April 8th, 1808.

To C. TAYLOR, M. D. SEC.

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CERTIFICATES.

A Certificate from Miles Ponsonby, Esq. of Hail Hall, testified that he had seen Mr. Curwen's statement of the rapid progress made by his cabbages in the month of June 1807; that he perfectly recollects viewing them on the Monday, and again on Saturday in the same week; that the improvement in the appearance of the plants was so great, that he imagined the land had been replanted, till Mr. Curwen explained the cause which had produced so great a change.

That he considers Mr. Curwen's plan of managing his potatoes and cabbages as very good garden husbandry, and the best calculated for keeping the land clean, improving the plant, and at the same time enriching the ground, of any that he had observed; and though the mode is entirely new there, he has no doubt but it will be found beneficial, and that it will in a few years be much attended to.

A Certificate from Mr. D. Campbell, Secretary to the Kendal Agricultural Society, stated, that he had attended to the cultivation of potatoes in most parts of Lancashire, and could speak with the greatest precision respecting it in that part of the county, which is north of Lancaster.

That whether they were planted in the lazybed way, by the dibble, or with the plough, they were always set in *rows* from *one end of a field*, or *piece of ground*, to *the other end or side*, with narrower or wider intervals, as the cultivator might deem best suited to the kind of potatoe he was raising. That he never before saw or heard of their being cultivated in beds, in the manner practised and described by Mr. Curwen, and that being more particularly desirous to ascertain whether any such method was pursued in the great potatoe district which lies south-west from Lancaster,

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including Pilling, the Felde, Rufford, and the neighbourhood of Preston, he applied to George Clayton, Esq. of Lostock Hall, and Robert Hesketh, Esq. of Warrington Hall, gentlemen upon whose accuracy the utmost dependance may be placed, and who informed him, that neither from their own knowledge, nor from inquiries they have made, can they learn that the method of cultivating potatoes alluded to, has been seen or heard of in a tract of country, where more are raised for the market than in any other of the same extent perhaps in the kingdom.

Mr. Campbell further stated, that Mr. Curwen's cabbages were planted at a much greater distance than any he had ever before seen, and their size far exceeded, as a general crop, any that had fallen under his observation; that the ground was perfectly clear from weeds, and from having been frequently turned over by the plough in the intervals, the mould appeared to be in fine order for a subsequent crop, and he conceived that in the two essential points of freedom from weeds, and of the land being in a fine tilth, no garden could exceed it.

Other Certificates respecting the novelty of the method of planting potatoes, as practised by Mr. Curwen, were received from the following gentlemen:

WILLLIAM KNOTT, Summerhill.
MR. SUNDERAND, Ulverston.
J. PENNY MARSHALL, Bolton Oak.

Further Certificates, stating the method to be new, as practised by Mr. CURWEN, for planting both potatoes and cabbages, were received from the following gentlemen:

WALTER GARDNER, Crooks.
WILLIAM HARRISON, Ulverston.

A. BENSON,

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A. Benson, Reading.
Henry Richmond Gale, Bardsee Hall.
Jos. Penny, Budgefield.
Edward Barrow, Allithwaite Lodge.
Charles Gibson, President of the Lancaster Agricultural Society.
Rev. J. Barns, Pennybridge.
Rev. E. Ellerton, Colton.
Jos. Yorker, Ulverston.
Michael Knott, Thurstonville.
Rev. Joseph Brooks, Ulverston.
Thomas Machell, Aynsome.

Also from the following Farmers, resident in the neighbourhood of Lancaster:

Thomas Tart.
William Armstead.
William Staller.
Anthony Eidsforth.
Christopher Atkinson.
Robert Edmondson.

Dear Sir,

Mr. Curwen having informed me, that a question would probably arise in the Society of Arts, &c. relative to the degree of exhalation of water from the earth, and it appearing to me to be intimately connected with various matters in agriculture, I think you will not be displeased at my mentioning a few circumstances, to prove that the object much deserves attention. I conceive that it bears upon

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the point of showing the great depth to which dung may be ploughed with safety; for when we find, as I have done, that from two to three thousand gallons of moisture are exhaled in a day from an acre of land, and that the quantity varies greatly according to the state of tillage, it should appear that such a vertical stream of vapour must remove all apprehensions of *burying* dung. I also think it goes to the point of hoeing and horse-hoeing such plants as demand much moisture. I have found that the dung in a farm-yard, laid three feet deep and hard trodden by cattle all the winter, has exhaled in the proportion of above four thousand gallons per acre in ten hours; from hence a practical conclusion may be surely drawn. I could much extend these observations, but they are sufficient to convince so enlightened a mind as yours of the propriety of a very extensive pursuit of this inquiry.

I have the honour to be,

With much regard, dear Sir,

Your faithful and very humble Servant,

ARTHUR YOUNG.

Board of Agriculture, May 6th, 1808.

To C. TAYLOR, M. D. SEC.

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The GOLD MEDAL *of the Society, being the Premium offered for the comparative Culture of Wheat, was this Session adjudged to* ROBERT BURROWS, *Esq. of Great Witchingham, Norfolk; from whom the following Communications were received.*

SIR,

I BEG you will have the goodness to communicate to the Society of Arts, &c. for their approbation, the following result of an experiment upon the comparative culture of wheat, conducted with a view of meeting the wishes of the Society upon the subject; and with that accurate impartiality which I trust will go far towards establishing (especially upon such sort of soils as those on which the experiment was made), that necessary, and among agriculturists, long-agitated question, respecting the best method of depositing the seed of that truly useful and valuable grain.

You will perceive, by the accompanying papers, that my experiment partakes of a twofold nature, having repeated it under two different preparations of the land: first, a clover stubble; a preparation for wheat well and deservedly known in almost every part of the kingdom. The other is a mode of preparing the land for wheat, perhaps, rather peculiar to some districts of this county, and is known by the name of a bastard fallow; and which I shall describe in its proper place. In each instance of trial, I have thought it best to exclude entirely the use of manure, deeming it not unlikely, that though the quantity of manure employed upon

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the occasion might be exactly proportioned, yet it was not improbable but that there might be some little difference in the quality of such manure so employed; especially when it is considered, that a very large heap of dung or compost was required to spread over the surface of twenty-four acres of land. Under that impression, I chose rather to trust to the previous good condition the land was already in, having for the four preceding years treated both fields exactly similar; and when under turnips two years before, the crops in both fields were two-thirds of them fed upon the land with both sheep and cattle.

I have likewise sent, for the Society's inspection, respective samples of the grain grown, together with specimens of the soils of each field in which the experiments were made, judging the latter step necessary, in case my description of the soil may not be perfectly and clearly understood. The Society, if they think proper, may avail themselves of a chymical analysis thereof.

I have the honour to remain, Sir,

Your most obedient humble Servant,

ROBERT BURROWS.

Great Witchingham, near Norwich, January 28, 1808.

To C. TAYLOR, M.D. SEC.

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The following is the Account of an Experiment on the comparative Culture of Wheat, made in the Year 1807, *by* ROBERT BURROWS, *of Great Witchingham, in the County of Norfolk.*

Clover Stubble Experiment.

In the autumn of 1806, I set out by the chain twelve statute acres of land in the middle of a field, containing by survey twenty-six acres; I again divided the twelve acres into subdivisions of four acres each: the soil, a deep sandy loam, tolerably rich, and what in the county of Norfolk is usually termed, an excellent turnip soil. I considered myself as extremely fortunate this year, in being able to appropriate to the experiment a portion of land so exactly similar in regard to quality of soil, as is not often to be met with in this county, where lands in some of the best districts are remarkable for varying materially, even in the same field, especially if that field is of any considerable extent. With so favourable an opportunity as the present, in the middle of a large field, without a tree, or even an hedge-row of sufficient height to have any injurious influence over my future crop, I commenced with considerable eagerness an experiment I had long been desirous of bringing to a crisis, and which I had twice before begun, and as often, from the interference of local circumstances, been obliged to abandon.

On the 22d of September 1806, and the two following days, I commenced the experiment, by ploughing the whole

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twelve acres nearly six inches deep, laying the same into stitches of ten yards in the breadth, which, as the soil was perfectly dry, I considered stitches that width the most convenient for the different operations I was about to perform. Upon the 25th of the same month I sowed the broadcast, two Winchester bushels per acre, harrowing in the seed immediately after, two, three, or more times in a place, until the whole or nearly the whole of the seed was buried. Such few remaining grains as were still uncovered I pressed into the earth, by causing a heavy roller to pass over the ridges the same way they were ploughed; an operation considered highly beneficial upon loose pulverised soil after seeding them, as the roller not only compresses the soil, but, in the case of broadcast particularly, it buries sufficiently deep in the earth for them to vegetate, (such grains as may have escaped the harrows,) and which, but for this operation, would become a prey to rooks and other birds; likewise, if the rolling is well performed, it prevents the seeds of a variety of weeds from vegetating.

On the same day the broadcast was finished, I employed three men to dibble the four acres on one side of the broadcast already sown. They began and finished the dibbling upon that and the two following days, in equidistant rows of four and a half inches asunder—the usual method of dibbling practised in the county of Norfolk, and which general method I thought necessary to adhere to in the present experiment. Two such rows upon a furrow nine inches wide, and the holes three inches apart from each other, or, upon an average, four holes to a foot measure, is considered as equivalent to one now drilled by Cooke's machine

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machine upon the same sized furrow. Three children follow one man, dropping the grain from two to four in each hole. The quantity of seed made use of upon this occasion was exactly six pecks per acre. At the time the dibbling was going on, two men and a boy, with Cooke's drill machine, drilled the four acres on the other side of the broadcast, in equidistant rows of nine inches,—a distance, perhaps, to be preferred to all others in drilling: for, if the space between the rows is less than nine inches, the horse-hoe can scarce be used with safety; and without the use of the hoe, drilling can only be called imperfect husbandry: and though, in the experiment which I am here detailing, drilling has only turned out second best, yet I am so well persuaded of its being an excellent practice on many kinds of soils in various parts of the kingdom, that I should be sincerely sorry to see the active and intelligent farmer reject it from his system of husbandry. For my own part, though the present result is contrary to my expectation, yet I shall not dismiss the drill from my farm, nor cease to use it even in depositing my future wheat crops. The quickness and ease with which the business of wheat sowing is performed; the completeness and facility with which weeds of various kinds may be eradicated, together with the neat and garden-like appearance of a crop under the drill system, will ever be with me powerful persuaders to its use; and perhaps, even in the present instance, its failure may properly be attributed to the loose and pulverised nature of the soil; which, rather than loosen still more by the frequent operation of horse-hoeing, ought to have been compressed by the feet of sheep or neat cattle, or by rolling, in those early spring months when the plants begin to tiller

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on the surface of the earth. The quantity of seed drilled upon the last four acres was exactly six pecks and a quarter per acre: the seed wheat made use of upon such occasion was the old Kentish red.

After having made a few observations upon the state and appearance of the crop under experiment, at various times between seeding and harvest, I shall then proceed to a statement of the expenses of cultivation, and an account of the produce. I shall afterwards consider the fallow experiment by itself, in the same manner as I have done the present; beginning with the state and preparation of the soil, the time and method of seeding, &c.

A few days after the various operations of dibbling, drilling, and sowing, were completed, the wheat in each instance made its appearance; the broadcast first, as probably that was not buried so deep in the earth as in the other two divisions, nor at such even distance from the surface: after the broadcast, the dibbled came up; and last of all the drilled, which latter, when all three were completely above ground, looked much more regular and beautiful than either of the others. From being sown early, the frosts of the winter never entirely destroyed their green verdure. During the winter season the broadcast, owing probably to its being thicker upon the ground, seemed to have the advantage in point of appearance, and maintained the same until the beginning of the month of March, when the drilled began to assume a very apparent superiority, by exhibiting a fine dark green hue, together with a broad reedy leaf. This decided advantage it maintained the greater part of the summer, until, having fully shot the ear, the whole field wore one general appearance and colour. Next to the drilled,

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drilled, the dibbled greatly exceeded the *broadcast* in point of health and promise; the latter, particularly towards the end of the month of May, lost its colour very fast, and looked rather pale and sickly throughout the rest of the summer. The circumstance of its looking more pale and sickly than either of the other two divisions, I could only attribute to its being too thick to admit a proper circulation of air between the plants, which I consider as one of the evils of broadcast crops: however, though aware that such might be the case, I conceived it necessary, in order to render the experiment useful and complete, to use, as near as I could, the same relative proportions of seed as are thought requisite by intelligent and practical farmers in general.

In stating the expenses, I shall forbear saying any thing of the rent, parochial rates, &c. attached to the land: as they are the same in each instance, and vary perhaps in their nature in different districts in the kingdom: as such, I shall leave individuals to apply them to their own particular situations, whilst I confine myself to such immediate expenses as attended each individual method from the time of seeding to the time of reaping the same, beginning in the order I have described them above.

Expenses of four Acres of Broadcast Wheat.

	£.	s.	d.
Seed, eight bushels, at 8s. per bushel -	3	4	0
One man half a day sowing the same -	0	1	0
Carried forward, £.	3	5	0

Harrowing

	£.	s.	d.
Brought forward,	3	5	0
Harrowing, two horses one day, with a lad attending the same	0	5	9
Rolling the four acres, two horses with a lad ½ a day	0	2	10½
Ploughing the land once, at 5s. per acre	1	0	0
The season of spring being remarkably wet, brought up many weeds of various kinds, particularly the red poppy, a species of weed the field, where the experiment was made, was much subject to. Here will appear, under such circumstances, the advantage of horse hoeing, which will be found materially to lessen the expense of weeding, which, in crops not planted in regular rows, must be eradicated either by the small hand-hoe, or by the hand only; and which methods were resorted to in the present broadcast crop, and done principally by women; the expense 8s. 8d. per acre	1	14	8
Reaping four acres at 8s. 6d. per acre	1	14	0
Threshing and carrying to market fourteen quarters two bushels and half a peck	2	2	9½
Expenses of cultivating four acres of broadcast wheat	£.10	5	0

Produce of four Acres of Broadcast Wheat.

	£.	s.	d.
Fourteen quarters two bushels and half a peck, sold to the merchant at 64s. per quarter	45	13	0
Value of the straw grown upon the above four acres of broadcast wheat, per acre two tons one hundred weight eight pounds, making in the whole			

eight

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	£.	s.	d.
eight tons four hundred weight two stone four pounds weight of straw, consumed, by covenant of lease, upon the farm; yet in the present instance I shall estimate the straw at the price given at the nearest market, Norwich, where straw is now selling at 3s. per hundred weight -	24	12	10
Value of the produce of four acres - -	70	5	10
Expenses of cultivating the four acres of broadcast wheat - - -	10	5	0
£.	60	0	10

Weight of the grain, per Winchester bushel, as weighed at the time of sale, sixty-one pounds.

Expenses of Dibbling four Acres of Wheat.

	£.	s.	d.
Seed, six bushels, at 8s. per bushel - -	2	8	0
Ploughing the land, at 5s. per acre -	1	0	0
Rolling the land before dibbling, a lad and two horses half a day - - -	0	2	10½
Dibbling four acres, at 10s. per acre -	2	0	0
Bush harrowing to bury the seed, one horse and boy half a day - - -	0	1	7½
Weeding, four women four days hand-hoeing, at 8d. each day - - -	0	10	2
Do. four women again two days, second time of hand-hoeing - - -	0	5	1
Do. three women two days, drawing by hand what escaped the hoes - - -	0	4	0
Reaping the four acres, at 8s. 6d. per acre -	1	14	0
Carried forward, £.	8	5	9

Threshing

	£.	s.	d.
Brought forward,	8	5	9
Threshing and carrying to market seventeen quarters one bushel and a half of wheat -	2	11	6¾
Expenses of cultivating four acres of dibbled wheat £.	10	17	3¾

Produce of four Acres of Dibbled Wheat.

	£.	s.	d.
Seventeen quarters one bushel and a half of wheat carried to market, at 64s. per quarter -	55	0	0
Value of the straw upon the four acres of dibbled wheat, estimated as in the foregoing experiment, two ton two hundred weight four stone per acre, on the whole, eight tons ten hundred weight, at 3s. per hundred weight, the price at Norwich	25	10	0
Value of the produce of four acres of dibbled wheat	80	10	0
Expenses of the cultivation of four acres of dibbled wheat - - - - -	10	17	3¾
£.	69	12	8¼

Weight of the grain, per Winchester bushel, weighed at the time of sale, sixty-one pounds and a half.

Expenses of Drilling four Acres of Wheat.

	£.	s.	d.
Seed, six bushels one peck, at 8s. per bushel -	2	10	0
Ploughing the four acres once, at 5s. per acre	1	0	0
Rolling the land before the drill machine to close and level the same, boy and horse half a day.	0	1	7½
Two men and a horse half a day, together with a boy to lead the horse drilling the wheat -	0	3	7½
Carried forward, £.	3	15	3

Harrowing

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	£.	s.	d.
Brought forward,	3	15	3
Harrowing the seed to cover it with earth, two horses and a boy half a day - -	0	2	10½
March 12, one man half a day 1s. a horse half a day 1s. 3d. together with a lad to lead 4½d. hoeing first time - - -	0	2	7½
April 4th, repeated the hoeing - -	0	2	7½
May 12th, one woman a day drawing such weeds as escaped the horse-hoe, by being intermixed in the rows of wheat - - -	0	0	8
Reaping the four acres, at 8s. 6d. per acre -	1	14	0
Threshing and carrying to market sixteen quarters three bushels of wheat. - -	2	9	1½
Expenses of cultivating four acres of drilled wheat	£. 8	7	2

Produce of four Acres of Drilled Wheat.

	£.	s.	d.
Sixteen quarters three bushels, sold to the merchant at 64s. per quarter - -	52	8	0
Value of the straw grown upon the four acres, estimated as in the two foregoing experiments, one ton nineteen hundred weight two stone four pounds per acre, or, on the whole four acres, seven tons seventeen hundred weight one stone two pounds, at 3s. per hundred weight	23	11	5
Value of the produce of the four acres of drilled wheat - - -	£. 75	19	5
Expenses of cultivating the four acres of drilled wheat, to deduct - - -	8	7	2
	£. 67	12	3

Weight of the grain per Winchester bushel, weighed at the time of sale, sixty pounds.

Before

Before I proceed to my statement of the fallow experiment, I shall take a comparative view of the above results in as concise a manner as possible, by briefly stating the expenses of cultivating an acre of land under each respective mode; applying thereto the local expenses of the parish or neighbourhood where the experiment was conducted.

Expenses of Cultivating an Acre of Wheat after the Broadcast Method of Husbandry.

	£.	s.	d.
Rent of land per acre	1	10	0
Composition for tythes	0	7	0
Parochial rates	0	9	6
Ploughing once for the crop	0	6	0
Seed	0	16	0
Sowing	0	0	3
Harrowing in the seed	0	1	5¼
Rolling and completing the work	0	0	8½
Weeding	0	8	8
Threshing and carrying to market	0	10	8¼
Interest upon capital employed, say 10l. per acre, the lowest rate at which a farmer can now stock his land at per acre	0	10	0
	£. 5	8	9

Expenses of Cultivating an Acre of Dibbled Wheat.

	£.	s.	d.
Rent of an acre of land	1	10	0
Composition for tythes	0	7	0
Carried forward,	£. 1	17	0

Parochial

Brought

Parochial rates -
Ploughing once for the crop -
Seed - -
Dibbling - -
Harrowing in the seed after the dibbler
Weeding - -
Reaping - -
Threshing and carrying out the crop
Interest upon capital employed -

Expenses of Cultivating an Acre of

Rent - -
Composition for tythes - -
Parochial rates - -
Ploughing for the crop -
Seed - -
Drilling - -
Harrowing in the seed -
Rolling the ground before drilling -
Weeding - -
Reaping - -
Threshing and carrying to market
Interest upon capital employed -

Produce of an acre of broadcast -
Expenses of cultivating an acre of do.

Profit - -

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	£.	s.	d.
Produce of an acre of dibbled wheat -	13	15	0
Expenses of cultivating an acre of dibbled wheat	5	11	1
Profit - - -	£.8	3	11

	£.	s.	d.
Produce of an acre of drilled wheat -	13	2	0
Expenses of cultivating an acre of do. -	4	19	3
Profit - - - - -	£.8	2	9

This statement is upon the supposition that the straw is of no other value to the grower than to convert into manure upon the premises, which is really the case with farmers in general, who are restricted from selling their straw by a covenant in their lease. Under circumstances where the straw is of a real marketable value, the disadvantages of the broadcast mode of husbandry will appear somewhat less; as a little must be allowed for its superiority in weight of straw over the drilled.

Experiment on the Comparative Culture of Wheat, upon a Preparation called a Bastard Fallow, by Mr. ROBERT BURROWS, *of Great Witchingham, in the County of Norfolk.*

Before I enter upon a description of the method pursued in the present instance, together with the result of the produce obtained, I shall first endeavour to explain what is meant by the husbandry term bastard fallow. From what I have seen of the agriculture of other counties, it appears to me to be a practice peculiar to the county of Norfolk; and even

even there I am glad to acknowledge, that together with the real fallowists of other counties, its advocates are daily growing fewer. Surely it must be absolute barbarism in husbandry, to plough up a field of clover or grass layer, in the midst of the hot dog-days of summer, and to embrace, as it were, with eagerness every opportunity of exposing its surface to the exhausting influence of a scorching summer's sun; yet such, if we may judge from the practice, seems to be the wish of every description of fallowists. The kind of fallow under consideration is ploughed up immediately upon the first rain sufficiently heavy to enable the plough to work after Midsummer; then again before harvest, and two or three times more before sowing the wheat. Such repeated ploughings, besides the injury they do in exhausting the soil, must undoubtedly be charged as labour to the account of the ensuing crop; nor is the farmer aware, that by forcing into existence every particle of vegetable matter the soil is capable of affording, though by that means he may obtain a considerable deal of straw to the crop immediately in view, yet he is by such practices reducing his land to a state of poverty and exhaustion incapable of affording sufficient nourishment for ensuing crops. Injudicious and repeated summer ploughing, I have not a doubt, impoverishes land, and renders it more barren than heavy and abundant crops of either hay or corn; and I trust that the increasing influence of public societies, established with a view of disseminating useful practical opinions, together with the example of liberal and enlightened farmers, will soon have the desirable effect of banishing from the husbandry of these kingdoms, those ridiculous and absurd prejudices that have so long disgraced that first of all professions, and grand source of all wealth—Agriculture.

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In conformity to the practice above alluded to, upon the 24th, 25th, and 26th of July 1806, I ploughed up twelve acres of a clover stubble, in a field adjoining to the one where the first experiment was made, and of a similar soil, that is to say, a tolerably good sandy loam. This ploughing was only just fleetly skimming the surface with the Norfolk wheel plough, about two inches deep, cross ploughed the twelve acres again about the 1st, 2nd, and 3rd days of September, harrowing the same well three times in a place. In this state the field lay until after harvest; then, about the beginning of October ploughed the same again; harrowing the land after the plough as before: I should here observe, the two last-mentioned ploughings were about 4½ inches in depth. On the 28th, 29th, and 30th of October, I had the whole twelve acres divided by the chain in divisions of four acres each laying, two of those divisions into stitches of twelve small furrows, each furrow nine inches wide, making the stitches three yards each across. These two divisions were now fit for the operation of dibbling and drilling, which immediately commenced; the first by dibbling two rows of holes upon each furrow, equidistant from each other four inches and a half, bush-harrowing directly after to fill up the holes with earth: whilst this was performing, a man, a boy, and a horse, put in the four acres adjoining, with Cooke's drill-machine, in rows nine inches asunder; each stitch formed exactly one bout for the machine, the horse up in one furrow and back in the other, which was effected by only moving the shafts of the machine nearer to the end of the beam, holes for that purpose being made in all Cooke's machines; thus upon each stitch were twelve rows, or one row upon a furrow, equal, as I have before observed, to the two rows of dibbled; and in this

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this instance exactly an equal quantity of seed used as in the dibbled work, an account of which will appear in the statements that follow. These two operations were performed upon the 31st of October, and 1st of November, at the same time the wheat was sown on the division appointed for the broadcast experiment, and had the same neatly ploughed under, in depth about three inches, laying the stitches into the same size as in the two foregoing experiments. The seed made use of was likewise of the old Kentish red stock, and had been sown upon the farm without changing, for many years past; nor was any manure made use of, for reasons mentioned in the first part of this paper.

The appearance of the crop throughout the summer was much the same as noticed in the former experiment: the drilled crop, from its first coming up till the whole field was in ear, always looked the richest and most pleasing to the eye. The expenses of weeding, &c. were nearly the same as in the clover stubble field, as will appear hereafter, and as to the deficiency in point of produce, I can attribute it to no other cause than the pernicious one above complained of, viz. the barbarous system of fallowing. The result of this latter experiment confirms me more than ever of the justness of my first notion, in not making use of manure in my experiment; as the land in this fallow experiment was in itself richer, and I believe, in regard to its state of condition, had rather the advantage of the clover stubble field. I believe in districts where this kind of husbandry is most prevalent, an ample manuring is in general made use of; yet after the additional expense of manure, an observer may easily perceive the crop is not more productive, nor even so much so, as a simple clover lay without any manuring whatever. Hence it is evident the fallowist fallows away as

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much, or more vegetable matter, than an ample manuring will again restore to the soil.

Expenses of four Acres of Broadcast Wheat.

	£	s.	d.
Ploughing the land three times, at 5s. per acre each time	3	0	0
Seed, eight bushels	3	4	0
One man ½ a day sowing the same	0	1	0
Ploughing the seed under, four acres, at 5s. per acre	1	0	0
Weeding, as in the former instance, done principally by hand, or the small hand-hoe: put out the work to two women, at 4s. per acre the first time, and 2s. per acre the second time of hoeing, together with three days work each at 8d. per day each, drawing by hand the remaining weeds that escaped the twice hoeing	1	8	0
Reaping the four acres, at 8s. 6d. per acre	1	14	0
Threshing and carrying to market, twelve quarters four bushels and half a peck of wheat	1	17	6½
Expenses of cultivating 4 acres of broadcast wheat	£12	4	6½

Produce of four Acres of Broadcast Wheat.

	£.	s.	d.
Twelve quarters, four bushels, and half a peck, sold to the merchant at 64s. per quarter	40	1	0
Value of the straw grown upon the above four acres, estimated as in the clover stubble experiment, at 3s. per hundred weight, seven ton five hundred weight five stone two pounds	21	16	11
Value of the four acres of broadcast	£61	17	11
Expenses of cultivating the four acres of broadcast wheat	12	4	6½
Profit	£49	13	4½

Weight of the grain per Winchester bushel at the time of sale, fifty-nine pounds and a half.

Expenses

Expenses of Dibbling four Acres of Wheat.

	£.	s.	d.
Ploughing the land four times for the crop -	4	0	0
Seed, seven bushels, at 8s. per bushel -	2	16	0
Dibbling four acres, at 10s. per acre -	2	0	0
Rolling the land before dibbling, a lad and two horses half a day - - -	0	2	10½
Bush harrowing to bury the seed, a lad and one horse half a day - - -	0	1	7½
Weeding, at 4s. per acre the first time, and 2s. the second time, two women four days drawing weeds by hand - - -	1	9	4
Reaping the four acres, at 8s. 6d. per acre -	1	14	0
Threshing and carrying to market fourteen quarters one bushel one peck, at 3s. per quarter -	2	2	5½
Expenses of cultivating four acres of dibbled wheat - - -	£14	6	3½

Produce of the four Acres of Dibbled Wheat.

	£.	s.	d.
Fourteen quarters one bushel one peck, sold to the merchant, at 64s. per quarter - -	45	6	0
Value of the straw of the four acres of dibbled wheat, at 3s. per cwt. seven tons fourteen cwt. two stone four pounds - - - -	23	2	10
Value of the produce of the four acres of dibbled wheat - - - -	68	8	10
Expenses of cultivating the four acres of dibbled wheat - - - -	14	6	3½
Profit -	£54	2	6½

Weight of the grain per Winchester bushel at the time of sale, fifty-nine pounds and a half.

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Expenses of Drilling four Acres of Wheat.

	£.	s.	d.
Ploughing four acres four times, at 5s. per acre each time	4	0	0
Seed for the four acres, at seven pecks per acre, seven bushels, at 8s. per bushel	2	16	0
Rolling the land for the drill, half a day, lad and one horse	0	1	7½
One man, a lad, and a horse, half a day drilling the four acres; the man at 2s. the horse at 2s. 6d. and the lad at 9d. per day each	0	2	7½
Harrowing after the seeds to close the drills, two horses and lad, say half a day	0	2	10½
One man half a day, with a horse and a lad hoeing the first time	0	2	7½
Second hoeing, though not absolutely necessary, as before	0	2	7½
Drawing weeds by hand, one woman a day	0	0	8
Reaping the four acres, at 8s. 6d. per acre	1	14	0
Threshing out and carrying to market thirteen quarters seven bushels and three pecks of wheat, at 3s. per quarter	2	1	11
Expenses of cultivating the four acres of drilled wheat	£11	4	11½

Produce of four Acres of Drilled Wheat.

	£.	s.	d.
Thirteen quarters seven bushels three pecks of wheat sold to the merchant, at 64s. per quarter	44	14	0
Value of the straw, at 3s. per cwt. seven tons eleven cwt. three stone six pounds	22	14	3
Value of the produce of four acres of drilled wheat	£67	8	3
Expenses of cultivating the four acres of drilled wheat	11	4	11½
Profit	£56	3	3½

Weight of the grain per Winchester bushel at the time of sale, fifty-eight pounds three quarters.

Again,

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Again, as in the first experiment, I shall s
penses and produce of a single acre under e
husbandry, and apply it, as in the former case
cular spot where the experiment was conducte

Expenses of cultivating an Acre of Broadcast W
a Fallow System of Husbandry, without M

Rent of an acre of land	-
Composition for tythes	-
Parochial rates	-
Ploughing for the crop, four times	-
Seed	-
Sowing	-
Weeding	-
Reaping	-
Threshing and carrying to market	-
Interest upon the capital employed, say, as in the former estimate, £10 per acre	-
Expenses of cultivating an acre of broadcast wheat	

Expenses of cultivating an Acre of Dibbled

Rent of land	-
Composition for tythes	-
Parochial rates	-
Ploughing for the crop, four times	-
Seed, seven pecks	-
Dibbling	-
Bush-harrowing after dibbling, together with rolling the land for the dibbles	-

Carried forward,

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	£.	s.	d.
Brought over,	4	11	7½
Weeding	0	7	4
Reaping	0	8	6
Threshing and carrying to market	0	10	7¼
Interest upon capital	0	10	0
Expenses of cultivating an acre of dibbled wheat	£6	8	0¼

Expenses of cultivating an Acre of Drilled Wheat.

Rent of land	1	10	0
Composition for tythes	0	7	0
Parochial rates	0	9	0
Ploughing for the crop, four times	1	0	0
Seed, seven pecks	0	14	0
Drilling	0	0	7¼
Harrowing in the seed and rolling before the drill	0	1	1½
Weeding	0	1	5¾
Reaping	0	8	6
Threshing out the crop and carrying to market	0	10	5¾
Interest upon capital	0	10	0
Expenses of cultivating an acre of drilled wheat	£5	12	8¾

	£.	s.	d.
Produce of an acre of broadcast wheat	10	0	3
Expense of an acre of ditto	5	17	7½
	£4	2	7½
Produce of an acre of dibbled wheat	11	6	6
Expense of an acre of ditto	6	8	0¼
	£4	18	5¾
Produce of an acre of drilled wheat	11	1	0
Expenses of an acre of ditto	5	12	8
	£5	8	4

Having

Having now brought each set of experiments to a conclusion, I shall here observe, that I have been as correct (even to the expense of a single farthing) as so large an experiment would admit of; and that however tedious and troublesome it has been to me, by often interfering with other departments of my business, yet such has been my ardent wish to see fairly decided so important a question in agriculture, as the best method of depositing the seed of any grain whatever, that I have never suffered any operation in the conducting the present business to be performed without my own personal inspection; and, in estimating the expenses, I have been cautious in fixing them within the moderate bounds of near and economical husbandry. In the account of my fallow experiment, I have charged nothing for the harrowings which took place subsequent to the two middle ploughings; my reasons for not doing it were on account of finding by experience in the conducting of the work itself, that in those long days a man, two horses, and plough, would do nearly one acre and three quarters per day, which at 2s. 6d. per day each horse, and 2s. the man is 7s. per day; an acre and three quarters at 5s. per acre, is 8s. 9d. per day. The overplus, 1s. 3d., I let go to the expense of harrowing; nor have I charged any thing for harvesting the wheat, against which I set the chaff, &c. from the barn doors at the time of threshing, the value of which I think will just about cover the expense of carting home in harvest. In the following manner I obtained the criterion by which I estimated the weight of straw grown upon an acre of each. In the beginning of harvest, one man went with me into each field, and in an exact and careful manner we set apart one square perch in each division, chosen from an average part of

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of the field; I had the same reaped and tied up in sheaves, and which stood to weather in the field the necessary time. Then I had them all conveyed to the barn, there separately threshed, and the grain from each perch measured, together with the straw nicely weighed; the result thereof is annexed.

Clover Stubble Experiment.

Measure of grain in a square perch of the broadcast wheat.	Weight of straw in a square perch of the broadcast wheat.
11¼ pints.	2 stone ¾lb.
Winchester measure.	14lbs. to the stone.

Clover Stubble Experiment.

Measure of grain in a square perch of the dibbled wheat.	Weight of straw in a square perch of the dibbled wheat.
13½ pints.	2 stone 1¾ lbs.
Winchester measure.	14lbs. to the stone.

Clover Stubble Experiment.

Measure of grain in a square perch of the drilled wheat.	Weight of straw in a square perch of the drilled wheat.
13 pints.	1 stone 13½ lbs.
Winchester measure.	14lbs. to the stone.

Fallow Experiment.

Measure of grain in a square perch of the broadcast wheat.	Weight of straw in a square perch of the broadcast wheat.
10 pints.	1 stone 11½ lbs.
Winchester measure.	14 lbs. to the stone.

Fallow Experiment.

Measure of grain in a square perch of the dibbled wheat.	Weight of straw in a square perch of the dibbled wheat.
11½ pints.	1 stone 13 lbs.
Winchester measure.	14 lbs. to the stone.

Fallow Experiment.

Measure of grain in a square perch of the drilled wheat.	Weight of straw in a square perch of the drilled wheat.
11¼ pints.	1 stone 12½ lbs.
Winchester measure.	14 lbs. to the stone.

CER-

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CERTIFICATE.

WE whose names are here undersigned, do certify, that the foregoing set of experiments upon the comparative culture of wheat have been conducted in an able and masterly manner, and fully calculated to attain the object in view, namely, the ascertaining of the best mode of depositing the seed in the ground; and we do likewise further certify, that the nature and condition of the soil is as within described, namely, a fine sandy loam, in a high state of cultivation. We have also viewed the crop during the time of growing, and do pronounce it to have been kept perfectly free and clear from weeds of every description, in the manner and at the expense within stated by the cultivator, Mr. ROBERT BURROWS, of Great Witchingham, in the county of Norfolk.

PETER LE NEVE FOSTEE, Great Witchingham.
JOHN ELMER, Great Witchingham.
WILLIAM FITZ MAY, Great Witchingham.
JOHN BOND, Cawston.
JAMES NORTON, Cawston.

The SILVER MEDAL *of the Society was this Session voted to* J. BUTLER, *Esq. of Bramshott, Hants, for his Improvement of Waste Land, and the following Communication was received from him.*

SIR,

IN the year 1802 I purchased an estate, situated in the parish of Bramshott, in the county of Hants, of which seventy acres and upwards were then waste lands, growing a little

a little timber, furze, and alder, and supporting a few cows in the summer, but never cultivated or considered worth that expense.

From particular engagements at the time, I did not begin any improvement till 1804, when I found sixty-five acres and a half (statute) of the said waste lands in the following state: twelve acres, the scite of old fish ponds, growing nothing but reeds and rubbish; eighteen acres one rood thirty-seven perches, affording a little sour grass and a few alders in wet places; twenty-seven acres three roods one perch, quite a morass or bog, with a few alders; and seven acres one rood four perches of very indifferent furze.

As the greatest part of the waste was filled with innumerable springs that deluged the whole, and caused the bog to be saturated throughout the year, I considered that draining was the first necessary step to be taken; with this view I made an open cut or ditch, of five to seven feet deep or more, in the lowest part of the bog, to let out the stagnated water, and ascertain with precision the cause that produced it. Having obtained the lowest possible fall by the open cut or ditch, I caused other cuts to be made to the heads of different springs which fed the land, occasionally boring with the auger, that no spring might be passed over; and I then laid the open cuts or drains with stones from three to twelve feet below the surface, according to circumstances, to carry off the water, observing always to keep the level.

At the highest ground I found rocks under which the principal springs lay, at the distance of at least fifteen feet, and from thence an immensity of water gushed out, which was easily passed off through the drains, and I had the satisfaction

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satisfaction to find, that in the course of two years the whole waste became perfectly dry, and so continued.

The extent of land thus drained being great, the cost of course is very considerable, and amounts to the sum of 338l. 2s. 11d.

During this I grubbed the greatest part of the land, which from the stems of oak and other timber that had formerly grown there, as well as the alder, furze, and some timber standing at the time I made the purchase, was no inconsiderable work, and cost for each oak stem ninepence, and for the soil on which the alders and furze grew, sixpence per rod, amounting in the whole to the sum of 95l.

The ground being now cleared, I ascertained, by the means of a water level, the position of a little brook which ran through the waste land, and found that it was practicable to turn water over thirty acres of it. This being an object of the first consequence, I spared neither pains nor expense to accomplish it; I removed the high banks round the fish ponds, which contained some thousand loads of soil, filled up very deep ditches and stew ponds, and laid several acres on an inclined plane; burnt the roots and rubbish, and prepared, by levelling and making water carriages, thirty acres for irrigation, of which sixteen acres, though rough and some pasture as before described, had by draining and feeding began to improve considerably; and in the spring of 1806, I was enabled to turn the water over such sixteen acres, from which I derived a tolerable crop of hay in that summer; feeding it harder afterwards, and watering it the following winter, there was a good supply of feed for sheep till the latter end of April, when it was laid up and watered as before, but with far better success, as the crop was not only

only greatly improved in quality, but likewise in quantity, producing more than two tons to an acre throughout the sixteen acres.

The residue of the thirty acres prepared for irrigation as before stated, formerly fish ponds and other rough lands, but lately levelled and sown with perpetual grasses, is now looking remarkably well, and will certainly be in readiness to receive the water, as soon as the land is firm enough for that purpose.

In accomplishing this work I had the assistance of Joseph Trigger, who lived with and managed the water meadows of the late Mr. Bakewell of Dishley, for more than twenty years; and it would be an act of injustice to him not to say, that the said land is prepared for a water meadow in a masterly style; this cost me not less than 223l.

As soon as I perceived the effect of my drains on the bog, which was composed of a good deep peat, I pared by hand thirteen acres of it, which I burnt, and spread the ashes; then ploughed the land once, and sowed it with cole seed in the month of July. The crop turned out very good, and fed one hundred and sixty-two shear hogs (Leicester) for two months; after which I ploughed it once only, and sowed it with white oats in the month of April 1807: at first the oats appeared sickly, but receiving a few warm showers in May, they recovered and flourished exceedingly, making a most excellent appearance, to the astonishment of the neighbourhood; for when reaped, they were estimated at from ten to thirteen quarters per acre, some parts being preferable to others, but the whole good; and I have no doubt, for at present they are not threshed, that the crop will amount to its estimate.

In the course of last year I pared seven acres more of the said

said bog, and burnt and spread the ashes in a similar way to the former, and sowed it with cole seed from one ploughing in July last, which likewise turned out a most excellent crop, and supported seventy-two large sheep on it for more than two months.

The expense of paring and burning the twenty acres came to 29l. 10s.

The remaining waste land being a lighter peat, mixed more with sand, I did not think it adviseable to pare and burn, but contented myself with fallowing it for turnips, with which it was sown last summer; but from the indifference of the season, the crop did not prove abundant, yet as much so as I had any reason to expect; and I have no doubt, by proper management of it, though by far the worst of the waste, it will shortly become very useful land, and produce in succession good turnips, barley, and seeds.

On a review of the foregoing statement, it will appear that the expense attending the improvement of the waste has been great; but it will be recollected, that the quantity of land reclaimed is very considerable, the greatest part of which has been drained and grubbed, and the face of it entirely changed; that on the comparison I now submit, I feel great satisfaction in being enabled to assert, in the judgment of able men, that at the time I made the purchase, the waste land was not worth more than 5s. per acre per annum on an average, which amounts to 16l. 7s. 6d. and that it is now worth and let as follows:

	£.	s.	d.
Sixteen acres of water meadow, 3l. per acre	48	0	0
Fourteen do. will shortly be as valuable -	42	0	0
Carried forward, £.	90	0	0

Brought forward,	£. 90	0	0
Twenty do. of reclaimed bog, 2l. per acre -	40	0	0
Fifteen and a half do. lighter peat, 1l. per acre	15	10	0
By the year - - -	£. 145	10	0

I have not pointed out minutely every step that has been taken to drain, to irrigate, or improve the said waste lands, because the subject is generally so well understood; but I trust I have stated sufficient to prove, that the soil, thus reclaimed, is turned to a great and lasting benefit.

J. BUTLER.

Bramshott, Hants,
Jan. 28, 1808.

To C. Taylor, M. D. Sec.

Certificates were received from the following persons, in testimony of the accuracy of Mr. Butler's statement.

Samuel Mence, Curate of Bramshott.
George Curtis, Surgeon.
Francis Denyer, Overseer.
James Chase, Churchwarden.
William Money, Yeoman.
John Fullech, Yeoman.
John Rowland, Tenant of the Premises.

The

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The SILVER MEI
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SIR,

I TAKE the liberty
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trees, nor do I supp
stand the Society co
matters they think de

Two years ago I t
where fruit is scarce
the soil appeared prop
verted the whole into
trees on each acre, in
trees are placed in row
is a space of two rods
or pears alternately, s
sists of cherry trees.
apple and pear trees
the cherry trees are t
and pear trees uniform
straight lines.

The orchard is now
or produced in the
thousand standard tre

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been properly pruned twice a year. Farming crops have been since produced on the same ground as good as formerly, the plough being allowed to go within two feet of the trees each way, so that for many years to come the land will pay the expenses, and yield a profit exclusive of the fruit. I have in one part planted medlars, quinces, plums, walnuts, and other trees, to make the fruit collection as complete as possible, and I have spared no expense which could tend to improve the whole.

I shall make it an object to destroy the coccus, an insect which is at present damaging all our orchards. I know the application of spirits of turpentine will do it, without injuring the trees; it is by far the most easy and expeditious method for that purpose.

I am, Sir,

Your obedient servant,

SAMUEL CURTIS.

Walworth, Dec. 12, 1807.

To Charles Taylor, M. D. Sec:

Certificates from M. P. Carter, D. D. Rector of Bradwell, and Mr. Thomas Fairhead, Churchwarden, confirmed that Mr. S. Curtis had planted about four thousand standard fruit trees on about forty-eight acres of land, and that the same were, on the 7th of April, 1808, in a thriving condition.

SIR,

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SIR,

THE certificate I sent you relative to my orchard, stated the number of trees to be about four thousand, but the real number is 4620 trees. I am sorry to have occasion to notice to you a disease in pear trees, almost as destructive, although not so frequent as that I mentioned to be produced from the insect on apple trees. This upon pear trees appears as a dry rotten scab, which keeps increasing until it penetrates even the hard wood, and as it proceeds surrounds the limb entirely. The following spring the limb dies from the diseased part upwards. I have not found any insect to be concerned in this disease, which frequently takes place upon the trees of most luxurious growth. Its commencement seems to be from the thick rind of the tree becoming spongy; it then begins to crack and look scabby, the inner bark becomes dark coloured, and the disease proceeds until the destruction of the limb takes place. Some particular sorts of pear trees are with me much more liable to this disease than others: Windsor, autumn, bergamots, Catharine pears, &c. I suspect the disease to arise in a great measure from the soil.

My new orchard is situated at Glazen Wood, near Coggeshall, in Essex. I think myself highly honoured by the inquiries of her Serene Highness the Margravine of Anspach concerning it. As her Highness has attended to the pruning of fruit trees both in England and on the Continent, doubtless she is aware of the existing diseases in apple and pear trees,—any easy remedy for them would be of immense consequence; and if her Highness can furnish any discovery relative thereto, it would confer a great service on the p

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lic, and be esteemed by me a very particular obligation and honor.

I remain, Sir,

Your obedient Servant,

SAMUEL CURTIS.

Glazen Wood, near Coggeshall,
June 3, 1806.

To C TAYLOR, M. D. SEC.

The SILVER MEDAL *of the Society was this Session voted to Mr.* RICHARD PARKINSON, *of Walworth, near London, for his Method of curing the Foot Rot in Sheep. The following Communications were received from him,*

SIR,

THE inclosed is the recipe for the cure of the foot rot in sheep, certified by the person who was my shepherd at the time I put the method into practice.

I am, Sir,

Your very obedient Servant,

R. PARKINSON.

18, *Harford Place, Walworth,*
April 6, 1807.

To C. TAYLOR, M. D. SEC.

To

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IN sheep thus aff
low to hold dirt; if
careful to let it out
wash their feet cl
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Let the sheep stand
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A Certificate, dat
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sheep.

Further Certifica
from MR. STEPH
PRESTON, shepher
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The SILVER MEDAL *of the Society was this Session voted to* Mr. W. WALLIS MASON, *of Goodrest Lodge, near Warwick, for his Method of Stabbing Hoven Cattle, to discharge the Rarified Air from the Stomach, when they have been overfed with moist Clover Grass. The following Communications were received from him.*

GENTLEMEN,

I BEG leave to lay before you a trocar and canula, for the relief of cattle, when gorged or hoven. Since I have introduced it, it has been used with the greatest success, having, in every instance tried, been proved a safe, easy, and effectual remedy.

I consider it will not be necessary for me to detail the dangerous consequences arising from cattle being hoven, as it is well known that the public are annually deprived of numbers of valuable cattle by this disorder. I am inclined to offer it as an instrument superior to that, for which the Society granted a premium in the year 1796, as I am of opinion that flexible tubes may be forced down the ventricle which conducts to the lungs, by which most dangerous consequences would ensue. An instance of this kind occurred last year in this neighbourhood, when intending to force the passage of the paunch, and occasioned the loss of the animal.

Neither the farmer or bailiff can be expected, when going the rounds of the farm, to carry with him at all times an instrument so large as one of the flexible tubes; even if he had it, he could not make use of it without the assistance of

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of a second person, and the disorder would be fatal in most instances, before such assistance could be procured.

I considered that the trocar and canula, commonly used by surgeons, might be employed to advantage for the relief of hoven cattle. I have improved the instrument, to answer better the purpose here intended of penetrating the tense hides of cattle, and such alteration materially facilitates the operation.

The method of applying it is, to penetrate with the trocar and canula through the hide of the beast, to the paunch on the near side, about six inches from the back-bone, at an equal distance from the last rib, and from the hip-bone; then to withdraw the trocar, and to leave the canula in the wound, until the air which the paunch contained has escaped. The canula may then be taken out, and the wound covered with a plaster of common pitch, spread on brown paper, about the size of a crown piece. All the danger incidental to the common mode of stabbing with the knife is effectually prevented, by the canula being left in the incision when the trocar is withdrawn.

The small expense of the instrument, its portability, the ease with which it can be used by an individual, its safety and efficacy in use, as it has not in any instance failed of complete success, will, I hope, be sufficiently evident to recommend it to the attention of the Society. A great saving would arise to the owners of cattle, and to the country at large, from general adoption of its use.

A feeding ox will thrive as well after the operation as if it had never been affected by the disorder. Cows in calf are in no danger from its use. It has been found particularly beneficial in preserving rearing calves, and young cattle, when afflicted with this disorder, which had heretofore been fatal to great numbers of them.

I beg

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I beg leave to add the certificates of a few of those gentlemen who have witnessed the utility of this method, and whose recommendations have stimulated me to submit it to the Society, in hopes, that by their liberal patronage, it may be rendered more generally beneficial to the public.

I have the honour to remain, Gentlemen,

Your obedient Servant,

W. WALLIS MASON.

Woodrest Lodge, near Warwick,
February 24th, 1808.

Certificates from the following gentlemen, testified that they had experienced the validity of Mr. Mason's trocar, had proved the safety of the operation, and the instantaneous relief which it had never failed to produce without leaving any blemish, or dangerous consequence, from its application.

JOHN FOORD NAISH, Leek Wootton.
THOMAS BRYAN, Warwick.
WILLIAM ORAM, Warwick.
WILLIAM LEDROOKE, Northend.
RICHARD CATTELL, Milverton.

To the Society of Arts, &c.

Reference to the Engraving of Mr. WALLIS MASON'S *Trocar and Canula.*

Fig. 1, Pl. 1, is a representation of Mr. Wallis Mason's trocar and canula. The blade of the trocar is of steel *aa*, fig. 4, fixed into a wooden handle *bb*. The shape of the blade of the trochar is oval, as shown in the end view of the canula, fig. 3. The canula or sheath *ee*, figs. 1 and 2,

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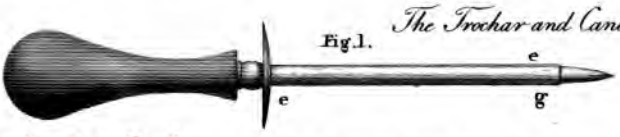
Mr. Mason's Trochar for relieving Hoven Cattle.

The Trochar and Canula.

Fig.1.

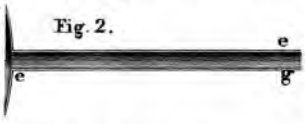


End view of the Canula.

Fig.3.

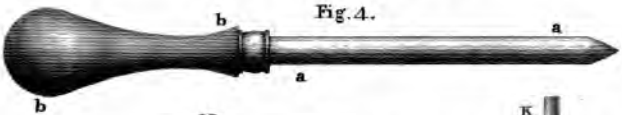
Section of the Canula.

Fig.2.



Trochar by itself.

Fig.4.



Mr. J. Fisher's improv'd Churn Staff.

Fig.5.

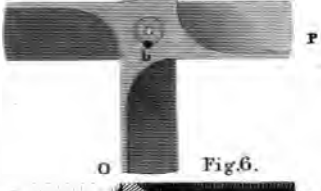
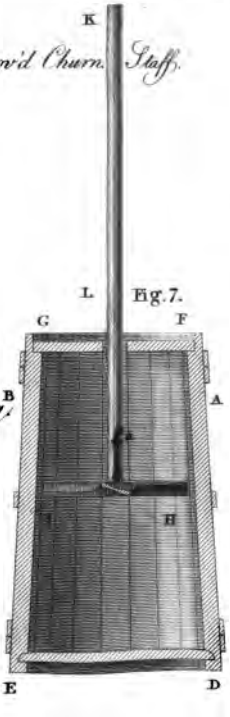


Fig.6.

Fig.7.



Mr. Tansley's method of cutting Shag.

Fig.8.

Fig.9

J. Furey, Jun.r del. Engraved by S. Porter.

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2, is an oval tube;
f f is a concave
canula, forming
giving too deep a
nula is worked do
struct the passage
a scale of one inch
2, the trocar and
shortest diameter
shown flat, in its l

FIVE GUINEAS
TIMOTHY FIS
a Swivel-head
making of Bu
tions were recei

SIR,

I BEG leave to lay
swivel-headed churn
fully proved to answ
ing the hard labour
greater degree than c
of its simplicity and
mon churn staff. It
through the cream.
the common, otherw
soon, or, according
to swelt it.

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I have tried it in a variety of forms and sizes: wings the labour was less relieved; also when I bevel to the ends of the wings.

When I gave more bevel it passed through wi ducing the intended effects. Experience therefo vinced me, that it is best to have four wings from inches in length, from the centre, according of the churn for which it is intended, from tv to three inches in breadth, made plane in middle, about the fourth part of their leng bevelled regularly off, so that the extreme p an angle of about 45 degrees with the plane The plane part acts with its usual force upo the body of the milk; and the points turnin give a kind of compound motion to the also alternate, and yet it does not in th throw out the cream as in the common m

The small bolt at the side, which I m lock the head, and prevent the wings fr whilst the butter is collected from the m ration of churning is completed.

I am, Sir,

Your obedien

T

Ormskirk, Lancashire, May 1st, 1808.

To C. TAYLOR, M. D. SEC.

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THOMAS ECCLESTON, Esq. of Scarisbrick Hall, near Ormskirk, certified, that he had seen Mr. Fisher's new method of churning butter, and that he thinks it superior to any he had heretofore known for that purpose, and that such was also the opinion of several other persons in the farming line who had witnessed its effects.

Reference to the Engraving of Mr. FISHER'S *Churn Staff.*

Fig. 7, Pl. 1, is a section of an upright churn, in the situation it would be when at work, and figs. 5 and 6 are enlarged views of the head of the churn staff. ABDE fig. 7, is a section of the churn; FG is the lid; KL is the churn staff, and HI the wings, or beaters; it is this part only which differs from the ordinary churn; it consists of four wings or vanes MNOP, fig. 5, firmly fixed together, and turning freely on a pin driven into the end of the churn staff. The flat part of each vane is cut, so as to be inclined to the plane in which all four lie, in the same manner as the sails of a windmill, as is well explained by figs. 5 and 6. When the beater is moved up and down through the cream, its action upon the oblique vanes causes it to turn round upon a pin above mentioned, as a centre. *a*, Fig. 7, is a small bolt sliding in a groove made in the churn staff, KL; its ends shut into a hole *b*, fig. 5, made in one of the vanes; when this bolt is pushed down, it prevents the vanes from turning round, for the purpose of collecting the butter together at the top of the butter-milk when the churning is done.

PAPERS

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PAPERS

IN

CHEMISTRY.

The SILVER MEDAL *of the Society was this Session voted to Mr.* WILLIAM ANDERSON, *of his Majesty's Dock-Yard, Portsmouth, for a Method of painting Linen Cloth in Oil Colours, to be more pliant, durable, and longer impervious to Water, than in the usual Mode.*

The following Communications were received from him, and Specimens of the Cloth and Colours are preserved in the Society's Repository.

SIR,

I BEG leave to lay before the Society of Arts, &c. the following improvements and observations, which I hope will be of service to the public.

Having never heard or read of any method being discovered to prevent paint when laid on canvas from hardening to such a degree as to crack and eventually to break the canvas,

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canvas, and render it unserviceable in a short time; and having been an eye-witness for many years of much canvas perishing for want of such discovery in the immense quantities painted for covering seamen's hammocks, and for other uses on board his Majesty's ships; I long had it under consideration to find out such an ingredient as, when mixed with paint, would preserve the canvas and paint laid thereon from the damages above mentioned, and after experiments for a considerable time, I have discovered such an article, and made trial of it with effect above three years.

The canvas I have painted has been submitted to the inspection of the Navy Board, who are so perfectly satisfied with my new method, that general directions are now given to paint all canvas in his Majesty's dock-yards in this manner, which, in addition to the advantages I have before mentioned, actually saves an expense of one guinea in every hundred square yards of canvas so painted, as I have fully stated to them. The ingredient I use is not only serviceable for ships' canvas, but also for canvas designed for paintings, for floor cloths, and for painted coverings within and without doors. I have no doubt of it being applied to many other purposes I am yet unacquainted with; as from actual trials of near four years, I can vouch for its being a preservative to red, yellow, and black paints, when ground in oil and put in casks. When the paints were examined at the expiration of such time, they discovered no improper hardness; but when laid on the work with a brush, they dried in a remarkable manner, without addition of any of the usual drying articles. I still preserve some of these paints for future trials, and I believe this plan of preserving colours will be of essential use to colourmen, and other persons who purchase colours for exportation. The ingredient

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dient I use is perfectly simple, being a solution of yellow soap; and the composition for painting is made in the following manner:

To one pound of soap I add six pints of water in a vessel over the fire; in a few minutes after the boiling of the water the soap will dissolve; whilst hot it is to be mixed with oil paint, prepared as hereafter directed, and is then fit for immediate use. The above quantity of soap'solution will be sufficient to mix with one hundred weight of paint. The first coat to be laid upon the canvas is to be intirely of this composition, without first wetting the canvas in the usual way. A very small proportion of it, or none, is necessary in the second coat; and the third coat should be of oil paint alone.

The method heretofore practised in his Majesty's dock-yards for painting canvas, was as follows: The canvas was first wet with water, then primed with Spanish brown; a second coat given it of a chocolate colour, made from Spanish brown and black paint; and, lastly, finished with black. This mode is destructive, and more expensive than mine, in the proportion before mentioned. *In my method,* to ninety-six pounds of English ochre ground in boiled oil, I add sixteen pounds of black paint, being one-sixth in proportion of the ochre; this, when mixed, forms an indifferent black. The solution made of one pound of soap and six pints of water, is to be added to this paint, and well united therewith; and without the canvas being previously wet, this composition is to be laid upon the canvas as stiff as can conveniently be done with the brush, and this first coat will form a tolerably smooth surface. The second coat is to be formed of the same proportion of English ochre and

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black, without any soap solution; and the third or finishing coat, to be done with black paint as usual.

I am, Sir,

Your obedient humble Servant,

WM. ANDERSON,
Master Painter of H. M. Dock Yard,
at Portsmouth.

Portsea, Oct. 31st, 1806.

SIR,

AGREEABLY to the request in your letter, I have inclosed certificates relative to my new method of painting canvas; and I take the liberty of informing you of a method of obtaining from painted canvas, unserviceable, the whole of the colour laid thereon, and to do it at a very small expense. This I discovered since I last wrote to you, and I believe it will be of considerable advantage to government, who, for want of such a thought, have buried and burnt immense quantities of ships' hammock cloths, when found unserviceable, to prevent embezzlement from taking place. I suggested the idea to N. Diddems, Esq. builder of Portsmouth yard, who communicated it to the Honourable George Grey, Commissioner. I obtained leave to make an experiment, which I repeated thrice, and found that from one ton of painted canvas, unserviceable, I obtained, upon an average, four hundred weight of dry colour, in value to government nine pounds six shillings; the expense of the process not exceeding six shillings.

This

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This I effected by calcination, raking aside the ashes and sprinkling them with water, to prevent loss of paint through excess of heat. By passing the calcined matter through a fine sieve, it is perfectly prepared for grinding; it grinds well, possesses a good body for covering with, and dries well with a good gloss. Its increase of bulk, in comparison with common colour of equal weight, gives it the advantage of covering more work. The colours yielded by the calcination of different coloured canvas are as follow, viz. Canvas which has been painted with black paint only, produces a black colour. Canvas finished black, but which has had a previous red or yellow ground, will produce a dark chocolate colour. Canvas painted lead colour, will yield a good dark lead colour.

I am, Sir,

Your obedient humble Servant,

WM. ANDERSON.

Portsea, March 25, 1807.

To C. TAYLOR, M.D. SEC.

Certificates, dated March, 1807, were received from the following persons, viz.

A. STOW, lieutenant and commander of the gun brig Steady, stating, that in the preceding month of October he had received on board his ship a set of hammock cloths, painted after the method invented by Mr. William Anderson, which had been constantly in use since the time above mentioned, and appeared fully to answer the end proposed, of rendering the canvas soft and pliable, of preventing its

 cracking,

cracking, or the paint peeling off, and which in the old method had been a subject of much complaint.

JOHN PRIDY, lieutenant and commander of the Gladiator, and formerly commander of the Dapper, on which latter ship a set of hammock cloths, painted after Mr. Anderson's method, appeared fully to answer the end proposed.

P. F. WYATT, oil and colourman, Portsea, stating that he had seen canvas painted after Mr. Anderson's new method, which, after a trial of sixteen months, remained perfectly soft and pliable, the paint by no means cracking or peeling off, and that the gloss was retained, though it had been exposed to all weathers. He further added, that he had seen the paint prepared by him from old painted canvas found unserviceable, and had worked and painted therewith; that it was, in his judgment, very good, and would answer either on canvas, wood, or iron.

NS. DIDDEMS, master shipwright, Portsmouth dock-yard, stating that Mr. Anderson had proposed to him to obtain, by calcination, from old unserviceable painted canvas, the paint which had been laid thereon; that such experiment was made, and four hundred weight of dry serviceable paint prepared from one ton of such canvas; that he had seen it when ground in oil and laid on work, when it appeared to possess all the properties of good paint, and had therefore been recommended by him to the Navy Board.

SIR,

IN answer to your letter of the 25th of April, in which you informed me that the Committee were desirous that I should furnish them with a sample of canvas painted in the old

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old method, and another on my improved plan, I trust that I shall be able fully to comply with their request. In the first place, I have sent a small sample of the residuum of the burnt canvas, fit for grinding in oil for paint, also a piece of canvas painted therewith, marked No. 1; another piece painted after the old method, marked No. 2; another piece painted according to my process, marked No. 3; and, lastly, a piece finished intirely with the new composition, marked No. 4; each sample having received three coats of paint. Upon examining No. 2, you will find it becoming from time to time more stubborn, in consequence of the paint hardening; and when a small ridge is formed in it, by pressing it between the finger and thumb, it will soon discover that it is subject to crack, and by this means permitting the wet to enter it, will soon rot the canvas.

The space of time proper between laying on the new preparation and the second coat, ought to be one entire day; but if saving time is an object, the second coat may be put on the day following the first; for if the canvas is placed in an advantageous situation for drying, the composition will dry or harden so as not to rub off.

Canvas finished intirely with the composition, leaving it to dry one day between each coat, will not stick together if laid in quantities, as you will find by making experiments on the sample No. 4.

Since the Navy Board have given directions for ships' canvas to be painted according to my method, I find, upon calculation, that I have painted upwards of twenty thousand yards since November last, a great part of which has not been hung up for painting and drying more than one week, as no more time could be allowed me, in conse-

quence of ships sailing. My plan was therefore to lay on the composition the first day, to coat it the second day, and leaving one intermediate day, to finish it on the fourth. Three days were then allowed it to dry and harden, and when afterwards taken down and folded together in cloths, containing sixty or seventy yards, they did not stick together.

Having no means of giving information to persons concerned in grinding colours, so well as through the medium of the Society of Arts, &c. I beg leave further to relate how I have, for the last three years, saved the labour of three men out of four in grinding colours with the common mills employed for that purpose. One mill has ever been considered sufficient for a man to turn, whereas one man can now, with perfect ease, turn four mills; this is effected by placing two mills on each side of the winch, so close as only to leave room for the fly wheel to play between them. The spindles of each on either side are locked together by a small iron collar, with a pin passing through it. The distance of the mills thus paired from each, in order for the man's standing between them to turn, is two feet six inches. The distance of the arms of the winch screwed on the end of the spindles on either side, is two feet two inches; the length of the arm is one foot six inches from the spindles to the bar across which the man clasps in order to turn.

Fly wheels at the extremity are impediments. Necessity was truly the mother of invention to me in this case, as I had great demand for paint, and I was not allowed men sufficient for the work in the common way.

Persons will scarcely believe, without seeing the experiment, the ease with which they turn. If a little extraordinary

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traordinary motion is
left alone, they will c
so that a man with on

I am

Portsea, May 6, 1807.

To C. TAYLOR, M. I

SIR,

I HAVE stated to the
ments made by me
thereof they have des
to report to them on t
for more than twelve
tion of them under th
same in stronger term
Lords Commissioners
closed to you a cert
which arrived here t
vessel I painted a set
teen hundred yards of
method.

I am

Portsmouth, Nov. 27, 18(

To C. TAYLOR, M. I

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The foregoing letter was accompanied with a certificate from Captain Hicks, and William Trounsell, carpenter of his Majesty's ship Hibernia, stating, that the hammock cloths on board the said vessel were painted in June 1806, after Mr. William Anderson's method; that they were pliable, and did not crack, nor the paint peel off, and were, in their opinion, preferable to those painted in the common way.

SIR,

I BEG leave to trouble you with a further certificate relative to the merits of my method of painting canvas.

I have also discovered a lead coloured paint, highly advantageous for all iron-work exposed to the weather, and preferable to that commonly made from white lead and black. The preparation is as follows:

Process for Lead Coloured Paint on Iron.

I take a fire shovel, and put a small quantity of common litharge thereon, and place it over the fire. I then take a small portion of flour of brimstone between my fingers, and scatter it over the litharge, when the same is sufficiently warm to give light to it. It is instantly converted to a blackish colour, which, when ground in oil, makes a good dark lead colour. It dries quick, gets remarkably hard, and resists the weather beyond any other lead colour. It will be extremely useful in the Ordnance department for painting guns.

I am, Sir,

Your humble servant,

WM. ANDERSON.

Portsmouth Dock Yard,
Feb. 26, 1808.

To C. TAYLOR, M. D. SEC.

The

This letter was accompanied with a certificate from J. B. Harrison, lieutenant and commander of his Majesty's brig Red-Breast, dated Feb. 26, 1808, stating, that the hammock cloths on board the said vessel were painted by Mr. Anderson, in April 1807, and had since that time been constantly in wear, and exposed to the weather day and night; that owing to this new mode they had been preserved supple, without cracking, and that the paint adhered to them in a far superior manner to the former mode of painting.

FIVE GUINEAS *were this Session voted to Mr.* THOMAS SADDINGTON, *No. 73, Lower Thames Street, for a Cheap Method of Preserving Fruit without Sugar, for House Use or Sea Stores. The following Communications were received from him, and Bottles of Fruits thus Preserved are placed in the Society's Repository.*

SIR,

I SHALL be much obliged to you to lay before the Society of Arts, &c. the inclosed communication, and a box containing the following fruits in bottles, preserved without sugar, namely, apricots, gooseberries, currants, raspberries, cherries, Orleans plums, egg plums, green-gages, damsons, and Siberian crabs. I have also sent some fresh English rhubarb plant, preserved in a similar manner. The same mode is applicable to other English fruits, as cranberries, barberries,

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barberries, and many more. This manner of preserving fruit will be found particularly useful on ship-board for sea stores, as the fruit is not likely to be injured by the motion of the ship, when the bottles are laid down on their sides, and the corks kept moist by the liquor, but on the contrary will keep well even in hot climates.

The cheapness of the process will render it deserving of the attention of all families from the highest to the lowest ranks of society. If the instructions I have sent are well attended to, I have no doubt that whoever tries my method will find it to answer his expectation.

I am, Sir,

Your most obedient humble Servant,

THOMAS SADDINGTON.

London, Jan. 8, 1808.

To C. TAYLOR, M. D. SEC.

A new Method to Preserve various Sorts of English Garden and Orchard Fruits, without Sugar.

GENTLEMEN,

THE general utility, as well as luxurious benefit, arising from the fruit produced by our gardens and orchards, is well known and acknowledged at the festive board of every family; nor is this utility and benefit less manifested by a desire of many persons to preserve them for culinary purposes, in the more unbountiful season of the year; and I am well persuaded that this commendable desire would be greatly

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greatly extended in most fam
so much expense as is gen
fruit in the common mode wi
constituting the basis by whi
to the expense of sugar, whic
son for not preserving, there
method, and what I am abou
sidered as the least, namely,
cess, occasioned by the stro
tained in many sorts of fruit.
that fruit may be preserved f
sugar by the ordinary mode of
closely stopped up, to which
even that method is frequently
for if the cork or other means
nal air out of the vessel beco
cause the atmospheric air exch
pregnated by the fruit, it soon
for use.

From these considerations,
fruit at a trifling expense, I hav
ful experiments of doing it with
time with a certainty of their
flavors which they naturally pos
bable that they will keep perf
years, or even a longer period
which it appears to become a va
exportation, as I have exposed
meridian sun in an upper room,
summer, after they have been so
1806). I have now the pleasure
ciety specimens of the fruit allu

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Process for preserving Fruit.

The bottles I chiefly use for small fruit, such as gooseberries, currants, cherries, and raspberries, are selected from the widest necked of those used for wine, or porter, as they are procured at a much cheaper rate than what are generally called gooseberry bottles. Having got them properly cleaned, and the fruit ready picked, (which should not be too ripe,) fill such of them as you intend doing at one time, as full as they will hold, so as to admit the cork going in, frequently shaking the fruit down whilst filling. When done, fit the corks to each bottle, and stick them lightly in, so as to be easily taken out when the fruit is sufficiently scalded, which may be done either in a copper, or large kettle, or saucepan over the fire, first putting a coarse cloth of any sort at the bottom to prevent the heat of the fire from cracking the bottles: then fill the copper, or kettle, with cold water sufficiently high for the bottles to be nearly up to the top in it: put them in sideways to expel the air contained in the cavity under the bottom of the bottle; then light the fire if the copper is used, taking care that the bottles do not touch the bottom, or sides, which will endanger their bursting; and increase the heat gradually until it comes to about one hundred and sixty, or one hundred and seventy degrees, by a brewing thermometer, which generally requires about three quarters of an hour. For want of such an instrument it may be very well managed by judging of the degree of heat by the finger, which may be known by the water feeling very hot, but not so as to scald it. If the water should be too hot, a little cold may be added to keep it of a proper temperature, or the fire may be slackened. When it arrives at a sufficient degree of heat, it must be kept at the same for about half an

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an hour longer, which will at all times be quite enough, as a longer time, or greater heat, will crack the fruit. During the time the bottles are increasing in heat, a tea-kettle full of water must be got ready to boil as soon as the fruit is sufficiently done. If one fire only is used, the kettle containing the bottles must be removed half off the fire, when it is at the full heat required, to make room for boiling the water in the tea-kettle. As soon as the fruit is properly scalded, and the water boiling, take the bottles out of the water one at a time, and fill them within an inch of the cork with the boiling water out of the tea-kettle. Cork them down immediately, doing it gently, but very tight, by squeezing the cork in, but you must not shake them by driving the cork, as that will endanger the bursting of the bottles with the hot water; when they are corked, lay them down on their side, as by that means the cork keeps swelled, and prevents the air escaping out: let them lay until cold, when they may be removed to any convenient place of keeping, always observing to let them lie on their side until wanted for use. During the first month, or two, after they are bottled, it will be necessary to turn the bottles a litle round, once for twice in a week, to prevent the fermentation that will arise on some fruits from forming into a crust, by which proper attention, the fruit will be kept moist with the water, and no mould will ever take place. It will also be proper to turn the bottles a little round once or twice in a month afterwards.

Having laid down the method of preserving fruit without sugar, in as clear and concise a manner as possible, I will recapitulate the whole in a few words, which may be easily remembered by any person. Fill the bottles quite full with fruit. Put the corks in loosely. Set them in a copper, or kettle of water. Increase the heat to scalding for about three

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three quarters of an hour; when of a proper degree, keep at the same half an hour longer. Fill up with boiling water. Cork down tight. Lay them on their side until wanted for use.

It may be said as an additional reason as well as cheapness, for using wine, or porter bottles, instead of gooseberry, is the difficulty of obtaining them, even at any price, in some parts of the country, and indeed they are equally useful for small fruit, and answer the purpose quite as well, excepting the little inconvenience of getting the fruit out when wanted for use, which may be easily done by first pouring all the liquor out into a bason, or any other vessel, and then with a bit of bent wire, or small iron meat skewer, the fruit may be raked out. Some of the liquor first poured off, serves to put into the pies, tarts, or puddings, instead of water, as it is strongly impregnated with the virtues of the fruit, and the remainder may be boiled up with a little sugar, which makes a very rich and agreeable syrup.

In confirmation of the foregoing assertions, I now produce twenty-four bottles as samples, containing twelve different sorts of fruit, viz. apricots, rhubarb, gooseberries, currants, raspberries, cherries, plums, Orleans plums, egg plums, damsons, Siberian crabs*, and green-gages—which have all been preserved in the manner above described.

In order to diversify the degree of heat, and time of continuance over the fire, I have done some in one hundred and ninety degrees, and continued them in it for three quarters of an hour, from which experiments it is evident, that the heat is too powerful, and the time too long, as the fruit by that degree and continuance is rendered nearly to a pulp†. In the summer of 1807 I preserved ninety-five

* Apples and pears may be done for shipping, &c.

† Some of these samples of 1807, were done in 180 and 190 degrees.

bottles

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bottles of fruit, the expense of which, (exclusive of bottles and corks,) was 1l. 9s. 5½d.; but having some fruit left, it will not be right to judge them at a higher rate than 1l. 9s.; and allowing 5s. for the extra coals consumed in consequence of my not having a conveniency of doing more than seven or eight at a time, and this being done at fourteen different times, it will amount to 1l. 14s. the average cost of which is nearly 4½d. per bottle, exclusive of the trouble of attending them; but if we estimate their value in the winter season, at 1s. per bottle, that being in general as low or lower than the market price, they will produce 4l. 15s. but losing one bottle by accident, reduces it to 4l. 14s. leaving a net profit of 3l. on ninety-four bottles, being a clear gain of nearly two hundred per cent. Another great advantage resulting from this statement will appear by making it an article of store for shipping, or exportation; and I shall submit a few ideas tending to promote such a beneficial object by doing it in large quantities; for which purpose sufficiently extensive premises must be fitted up, with a proper number of shelves, one above another, at a distance of about five inches.

The vessel for scalding the fruit in, should be a long wooden trough of six, eight, or ten feet in length, two or three in breadth, and one in depth, fitted with laths across to keep the bottles upright, and from falling against one another; this trough of water to have the heat communicated to it by steam, through a pipe from a closed boiler at a little distance. The boiling water wanted to fill the bottles with, may be conveyed through a pipe and cock over the trough, by which arrangement, many hundreds of bottles might be done in a short time. It may be prudent to observe that this idea is only speculative, not having been actually practised, but at the same time seem to carry with

with them a great probability of success, and worthy the experiment.

It remains now that I state some reason or object for troubling the Society, whom I have taken the liberty to address with these communications. The first is a desire of publicity, sanctioned by their investigation of the experiments made for preserving fruit without sugar, thereby lessening the expense attending an object of so much public benefit and utility. The second arises from a personal or private consideration; but on this subject I shall only observe, that I wish to throw myself entirely on that protection which has ever characterised the liberality of the Society; and that I shall feel highly honoured if they conceive what I have communicated deserving any mark of their favour.

I am, Gentlemen,

Your most obedient humble Servant,

THOMAS SADDINGTON.

Wood Street, London,
January 1, 1808.

To the Society of Arts, &c.

PAPERS

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PAPERS

IN

MANUFACTURES.

The GOLD MEDAL *of the Society was this Session voted to* GEORGE WHITWORTH, *Esq. of Coxwold, near Castor, Lincolnshire, for his Exertions in Manufacturing Ropes and Sacking from Sheep's Wool, to answer the Purpose of similar Articles made from Hemp.*

The following Communications were received from him, and Samples of Ropes and Sacks thus Manufactured are preserved in the Society's Repository.

SIR,

HAVING been so happy as to form from long sheep's wool two descriptions of manufactures, namely, worsted rope, and woollen sack, I conceive their extended use will be of great national benefit. I beg leave, therefore, to offer specimens of both these articles to the Society's attention; and if they meet their approbation, I shall be

 convinced

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convinced that I have done my country a service. I wish to throw them freely open to the public, conceiving that, though I might benefit myself by a more selfish conduct, yet by diffusing the manufacture generally, I shall render great service to many others, which, with a good man, should ever be the first consideration.

Any particular information which the Society may require upon the subject, I will furnish with pleasure.

I have the honour to be, Sir,

Your faithful Servant,

GEORGE WHITWORTH.

Cuxwold, near Caster, Lincolnshire, March 2, 1808.

To C. Taylor, M. D. Sec.

SIR,

Since I had the honour of addressing the Society, I have received much information from many respectable men in various departments, and I am encouraged to believe that woollen sacking and cordage will be found more generally useful than I had even hoped.

My first expectations led me to suppose they would be adopted by persons engaged in agricultural pursuits, and other departments immediately connected therewith, and that the woollen sacks would answer for the corn factors, in Mark Lane, instead of those made of hemp; and I was convinced by all the persons I advised with, that even to succeed so far would, at the present crisis, be productive of great and happy consequences to this country. I am now led to see this business in a more important light, and think

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think I may now venture to calculate upon these articles not being used merely by farmers as a substitute for hemp, in order that hemp may be spared for naval purposes, but I have reason to hope they will in some cases have advantages over it. Worsted ropes for breechings of guns will, from their great elasticity, probably be found more to be depended upon, by yielding in some degree to the recoil of the gun, and less liable to break than hempen ropes: they will also be well calculated for running rigging in particular situations. According to Mr. Luccock, who is, I believe, our best authority, Great Britain produces about 137,000 packs of decidedly long wool, each of 240 pounds weight, and, I believe, full two-thirds of this is at this moment in the hands of the farmers and wool staplers, independent of the quantity now in the first processes of manufacture only; and the time of shearing is fast approaching. A great deal of short wool may be used in manufacturing sacks, and I am of opinion that the manufacturers would gladly devote 15,000 tons to make these articles, particularly when it is known that the woollen ropes, when worn out, will be again useful as wool to the manufacturers, and that it will then serve as well for coarse woollens as if it had not been made into ropes. It occurs to me that a great quantity of hemp will be required to be grown at home, unless we adopt these manufactures; and at a moderate calculation, 15,000 tons of hemp would require more than 7,000 acres of land to produce it; and which quantity of land would produce more oats than would half supply with them this metropolis, besides furnishing many other articles.

The first cost of these ropes will, by their being made from combed wool, be about three pence per pound dearer than hempen ones, but the difference will be more than

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twice recompensed by the superior value of the old material after being employed, which I presume will, under all circumstances, be worth nearly two-fifths of the original wool.

I speak of the worsted rope, because I have manufactured another kind of rope from scribbled or carded wool, which can be afforded at even a less price than hempen ropes, but which will not be so durable as worsted ropes, nor perhaps be capable of being again manufactured; nor would it employ so many hands to manufacture, which, whilst so many people in Yorkshire are in great distress for want of work, should be taken into consideration.

I am told by naval men that the sacking will make very good hammocks, and it will be afforded at the same price as the hempen ones now in use.

I am afraid of being thought too prolix, but I am so much impressed with the importance of the subject, and of the great saving to this country of money heretofore sent to Russia for hemp, and of other great benefits which would arise to this nation by adopting the plan I recommend, that I am induced to solicit the attention of the Society to it, as I am convinced that their recommendation would bring them into general use.

I am, Sir,

Your humble and faithful Servant,

GEORGE WHITWORTH.

London, March 8, 1808.

To C. TAYLOR, M. D. SEC.

SIR,

I TAKE the liberty of adding some further particulars on the subject which I had the honour of addressing to the Society.

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Society. I have lately made several more experiments upon both the rope and sacking, and am now able to speak with a greater degree of certainty respecting them; and after the polite attention I have experienced from the Society, I should think myself greatly blameable if I did not give you every information in my power upon the subject. I have tried at a breaking machine one of the ropes twenty-four feet nine inches long, and three inches three-tenths in circumference; its weight was eight pounds three ounces, and it bore a weight of one ton thirteen hundred three quarters and sixteen pounds without breaking, but was broken by a weight of one ton fourteen hundred one quarter and twelve pounds. I am much obliged to Mr. Stothard, who furnished me with the rope, for his readiness in complying with my wishes. I conceive that for a first attempt this and all the ropes I have exhibited are very good, but the rope-makers in London tell me that they are capable of being made considerably stronger. From the examination of the pile of the broken rope, it appears not to have been sufficiently longitudinally laid, as it stretched to a very great extent, and I suppose, before it broke, was drawn out so as not to be more than two and a half inches in circumference. I am happy to say that the Navy Board, at whose request I furnished some ropes, have desired me to send some wool to the yard at Woolwich, for the purpose of being manufactured there; of course it will there have the advantage of a fair trial, and it will soon be determined whether woollen ropes can be of advantage to the royal navy.

As I have not been at sea, I am not competent to judge with certainty of the merits of either the worsted ropes or sacking for naval purposes, but I will boldly venture to predict, that in many situations familiar to me, wool will

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be found very superior to hemp; and it will be a great national benefit if we are at once able to give up hemp to the use of the navy.

Wool used upon my plan will furnish employment to manufacturers, who are now in great need; it will relieve the growers of long wool, by taking an article at a fair price, which must otherwise remain a drug upon their hands, and it will give new life and vigour to our internal commerce. The hammock is also under consideration of the Navy Board, and I have the greatest hope that its use will be adopted. I have the most respectable testimony of the value of the woollen sacking for corn-bags, from the gentlemen in the corn market, and which I am happy to say was almost on my part unsolicited. I have sent a fresh specimen of the article for your notice. I saw one of the bags, containing about seventeen pecks of wheat, thrown from the shoulder of a tall man upon a boarded floor, without the least injury being done to the sack; which experiment was considered by the persons present to be a proof of sufficient strength for any purpose for which sacks ought to be used.

The sacking will be particularly useful for the bottom of beds, and in many other situations where hemp has heretofore only had a place. The price of worsted and woollen sacking is near one shilling and sixpence per yard, and hempen sacking from one shilling and three pence to one shilling and four pence per yard, twenty-five inches in width.

The rope will I believe be to hemp as follows, in point of weight and value, new and old, of the same size:

17¼ ounces hemp, worth, new, 13d. worth, old, 1d.
12 ounces wool, do. 12d. do. 4d.

Raw materials of both articles taken at 84l. per ton.

Every

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Every trial I have made correspc
above; and when worsted rope is l
perfection, I have no doubt but a r
will be found cheaper in the first in
one, which, added to the advantage in
be a very weighty recommendation.

I put some very small traces into u
and on my return home I found then
vants told me the extreme wet weath
them, and that they had this advantag
that they did not stiffen on drying, bu
soft as before they were wet. A man
informed me that he has used a wooll
without any extraordinary care, in tu
the axis of a water wheel, and that h
much longer than any hempen one h
the same time and situation.

I have given woollen ropes of diff
my neighbours, and I have most fav
all of them. I could have sent certif
under the hands of very respectable n
short time the whole country will be
value, as I understand a meeting h
neighbourhood, to consider how far
adopted in agriculture, and some com
I believe it is now fully ascertaine
cylinders in all machinery, wool wi
perform its office better than hemp; a
cranes, coal heaving, and in every sit
much friction, wool will be found m
from experience that almost any ordi
a rope sufficiently good for the use o
ordinary purposes, after the wool ha

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only; and I wish it to be generally known, that there is no difficulty in altering a loom of almost any description in a short time to a sacking loom; and I am of opinion that some of the coarse wool of this island, not considered as decidedly long, would make very good sacking in part, and very useful rope. I shall now conclude my letter, and shall be very proud to have been in any degree useful to my country. I have certainly given a great portion of labour to the cause, and have been at considerable expenses in promoting an object which I firmly believe to be of much importance at this juncture. I beg leave to tender you my best thanks for the attention you have shown me; and if the Society shall consider my experiments worthy of recommendation, I shall then be fully convinced that my time and attention have been directed to a truly desirable object.

I have the honour to be, Sir,

Your devoted humble Servant,

GEORGE WHITWORTH.

Cuxwold, April 23, 1808.

To C. TAYLOR, M. D. SEC.

CERTIFICATES.

SIR,

WE, the undersigned, have examined the woollen sack exhibited by George Whitworth, Esq. and can see no reason to imagine but that it may be rendered in every respect as useful as hempen ones, and at little, if any, additional price; and under the present situation of this country, with regard

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regard to Russia, &c. we think it may prove a discovery of national benefit.

ROBERT and JOHN WILSON.
GILES and HENNINGS.
WILLIAM GILLIES.
MATTRASS and FOTHERGILL.
ROBERT and JOHN HEWETSON.
AUGUSTIN GEORGE, jun.
SAMUEL HOLLINGSWORTH.
CHRIS. DUNKIN and J. HAYS.
W. RANDELL.
MATTHIAS WILKS.
J. and W. BURGESS.

Corn Exchange, Mark Lane,
April 13, 1808.

To C. TAYLOR, M. D. SEC.

SIR,

BY desire of George Whitworth, Esq. I send you the sack which was exhibited on our stand at Mark Lane. I am very sorry we could not get a quantity in time to ship clover seed in this season, as that would have distributed them through every part of the country; and the farmers seeing them, might have employed the weavers in their own neighbourhood to manufacture them for their own use, much lower than by procuring them from one particular neighbourhood, and which is the liberal idea of the inventor.

You

You will also receive a piece of the rope, which bore one ton thirteen hundred three quarters and thirteen pounds. I attended the experiment, and found the ropers to be of opinion that they could manufacture one from similar materials much better, this rope having been sent from Lincolnshire. I have very little doubt but that this discovery and application of wool will prove highly beneficial to the farmer, and probably of the greatest importance to the country.

I am, Sir,

Your obedient Servant,

JOHN FOTHERGILL.

No. 22, Colchester Street,
Tower Hill, London, April 26, 1808.

To C. TAYLOR, M. D. SEC.

SIR,

I FEEL much honoured by the inquiries you have made from me, by desire of her Serene Highness the Margravine of Anspach, respecting the mode of spinning the wool for my sacking; and it gives me great pleasure to have an opportunity of affording any information to a lady so distinguished for her endeavours to promote the interest of this country.

As the warp is made of one description of wool, and the weft of another, it requires a different process to bring the former into worsted, from that which converts the latter into yarn. The worsted is spun from combed wool, upon a machine called by the Yorkshire manufacturers a frame. These, in the factories I have seen, are generally so constructed

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structed that a boy or girl can conveniently attend about forty spindles; the worsted thread is afterwards doubled and twisted upon another machine, called a twisting frame, and it is then ready to form the warp. The yarn used for weft is made of very coarse wool, and generally rather short: I believe some of the lowest sorts of Scotch wool have been used for this purpose. The wool is pulled or opened by a machine called the willy, and is afterwards passed through the scribbler; it is then carded by another machine, and is ready for spinning by the common spinning jenny, with which a man or woman, by hand, can spin about forty threads at once, assisted by two or three boys, who supply the cardings. I have probably been more explicit than necessary on the subject, but I wish fully to comply with her Highness' request. As you have obligingly offered to accept any addition to my former communication, I shall now observe, that a considerable contract for hammocks is now executing at Doncaster, and I hope they will prove superior to those made of hemp. The woollen sacks and ropes, as far as they have been hitherto tried, have fully answered expectation. The traces and plough lines are as good to appearance after three months constant use, as when new; and worsted waggon ropes, for binding loads of hay or corn, are much approved of by all my waggoners, and were certainly more to be depended upon in the late hot weather, when the hay was excessive dry, than hempen ones. It was obvious to every one, that the loads bound by woollen ropes were brought home more regular and even than the others. I suppose it was owing to the elasticity of the wool that this was effected. I state this, as I think it will give you satisfaction to hear, that what you had formed a favourable expectation of, answers so well.

It

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It is, in my opinion, the duty of every Englishman to consider early the things we can resort to at a time of necessity.

I remain, Sir,
With the greatest respect,
Your obliged and obedient Servant,
GEORGE WHITWORTH.

Cuxwold, August 6, 1808.

To C. TAYLOR, M. D. SEC.

FIVE GUINEAS *were this Session voted to* MR. PETER TANSLEY, *at the White Horse, Wheeler Street, Spitalfields, for his Improvement in Cutting Silk Shag Edgings, from whom the following Communications were received. An explanatory Engraving is annexed, and the Implement is preserved in the Society's Repository.*

SIR,

IN the latter end of March, 1806, my employer, Mr. Jeffery, of Bow Lane, Cheapside, applied to me with a pattern of silk shag, about six eighths of an inch wide, which he wished to be executed as quick as possible.

Being aware how tedious an operation it was to cut the shag with the trivat, the instrument generally used by the shag weavers for that purpose, I thought I could invent an instrument which would cut it in one-third of the usual time; I therefore drew the plan of one, and gave it to Mr. Baker, a cutler in Artillery Passage, Artillery Street, Spitalfields, to make according to my instructions, which he did, and which answered my expectations in the work.

In

In October, 1806, I made for the same gentleman a figured shag, one inch and three quarters wide, and cut it with the same instrument, as certified by my employer and his son-in-law. I hope the Gentlemen of the Society will not think me too presuming in offering this improvement to their notice.

I am, Sir, with great respect,

Your obedient Servant,

PETER TANSLEY.

White Horse, Wheeler Street, Spitalfields, April 28, 1808.

To C. Taylor, M. D. Sec.

Reference to the Engraving of Mr. Peter Tansley's *Implement for Cutting Shag. See Plate I. Figs.* 8, 9.

Fig. 8 shows the steel implement or cutter, as placed or woven within the threads, previous to their being cut with it, the cutting being performed by merely drawing out the knife, the sharp edge of which cuts the threads, and forms the shag by that operation.

Fig. 9 shows the implement detached from the work, R being the part held in the hand, and S the sharp blade which cuts the threads.

SIR,

This is to certify, that Peter Tansley, of Wheeler Street, is the sole inventor of the cutter for making narrow shag; that its utility is well known; and that I have, within fourteen

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fourteen days, made four hundred of these improved instruments.

W. BAKER,
Working Cutler, 13, *Artillery Passage*,
Bishopsgate Without.

To C. TAYLOR, M. D. SEC.

Certificates were received from the following persons, stating the very great utility of the instrument, their persuasion of its being superior to any other thing of the kind ever invented, as making the work equally good, with greater ease and in half the time, and that Mr. Peter Tansley is the original inventor.

THOMAS JEFFERY, 48, Bow Lane, Cheapside.
THOMAS BRADLEY, jun. Chiswell Street.
WILLIAM HEWITT, 2, Wilson Street, Moorfields.
THOMAS BRIGHT, 48, Gutter Lane.
JOHN FARMER, 3, Staining Lane.
W. OGBUN, 11, Beech Street.
HENRY OGBUN, Crown Street.
JOHN OGBUN, 75, Sun Street.
STEPH. WATTERS, 37, Wood Street, Cheapside.
JOHN PETER CLARET, Hayes Court, Soho.

PAPERS

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PAPERS

IN

MECHANICS.

The SILVER MEDAL *of the Society was this Session voted to Captain* WILLIAM BOLTON, *of the Royal Navy, for his Improvement in Jury Masts. The following Communication was received from him, an Explanatory Engraving is annexed, and a Model is preserved in the Society's Repository.*

SIR,

HEREWITH you will receive the model of a plan for fitting ships' jury masts, to be formed from the spare spars usually carried on board King's ships, and in every merchantman that is properly found. By having jury masts so fitted, ships will be enabled to carry as much sail as on the usual regular mast; the great use of which I need not dwell on, only observing that it may be of great importance to fleets after a general action, or when in want of proper lower masts, either at home or abroad, and enable ships, after the loss of their mast, to prosecute their voyage, or service, without any deficiency of sail.

I beg

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I beg you will be pleased to lay it before the Society, and I have the honour to be,

Sir,

Your obedient humble Servant,

WM. BOLT.

His Majesty's Ship Fisgard,
Sheerness, Oct. 31, 1807.

To C. TAYLOR, M. D. SEC.

REMARKS.

IN the model in the Society's possession the main mast is broken about one-third of its length above the deck, proper partners are secured on the deck, in which a hand mast and spare main top mast are fixed on each side of the broken main mast, and secured thereto by two spare caps, mortiçed on a square made in its centre. A strengthening cap, moveable on these additional masts, connects them, and the upper parts of these masts are secured firmly by trustle trees in the main top. The foot of a spare fore top mast passes through a cap made from strong plank, mortiçed into the heads of the two temporary masts above mentioned, goes through the main top, and rests in the moveable strengthening cap, which connects those two masts, and enables the fore top mast to be raised to any height which the main top will admit, and be then firmly secured by the upper cap, the main top, and the strengthening cap below it. The fore top mast being thus adjusted, the cross trees and top gallant mast are mounted upon it, which completes the whole business.

Two caps are the only things necessary to be made expressly for the purpose, the other articles being usually ready on board the ship.

Reference

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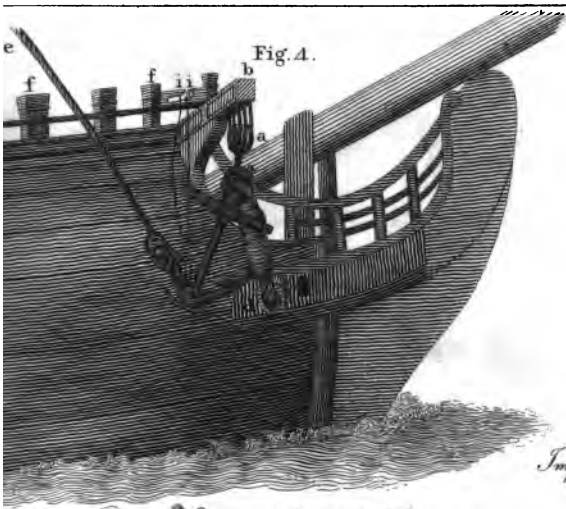
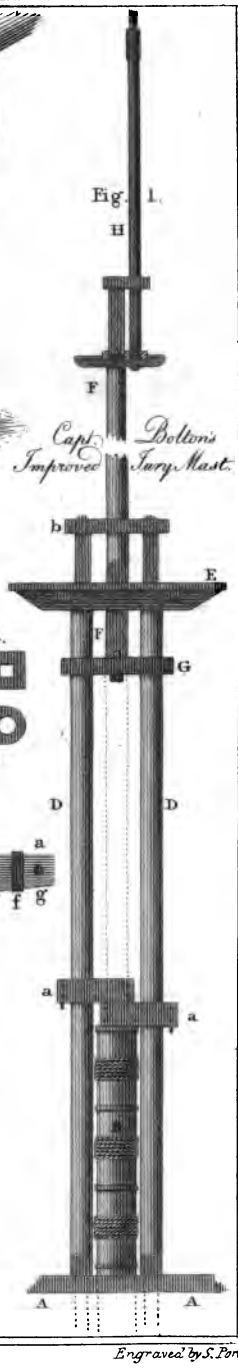


Fig. 4.

Fig. 1.



Capt. Bolton's Improved Jury Mast.

Capt. Ball's method of Fishing an Anchor.

Fig. 5.

Fig. 2.

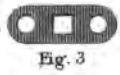
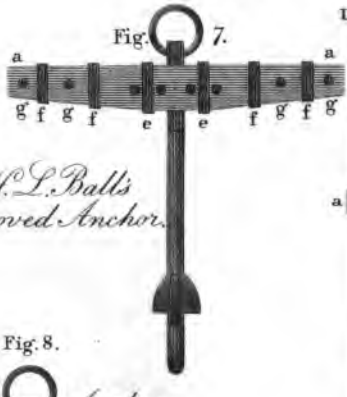


Fig. 3

Fig. 6.

Fig. 7.



Capt. H. L. Ball's improved Anchor.

Fig. 8.

Common Anchor.

J. Farey jun.r del.

Engraved by S. Porter.

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Reference to the Drawing of Captain Bolton's Jury Mast. Plate II. Figs. 1, 2, *and* 3.

Figs. 1, 2, and 3, where A A represents the partners or pieces of timber which are bolted to the quarter deck for the mast to rest upon. B is the stump of the lower mast, which is cut square at the top, and of the same size as the head of the mast originally was; upon this square, the main and spare lower caps *a a* are fixed; two mortices must be cut in the partners A A to receive squares made at the lower ends of the two temporary masts D D, which are supported by the caps *a a*, one of them is a spare main top mast, the other a hand mast; these two support the main top E, additional squares being made on the tressel trees to receive each of them. *b* is a cap shown in fig. 2, made of four inch plank doubled for the purpose, and fitted upon the heads of the masts D D, for a fore top mast F F, the heel of which rests in a mortice made in the stump of the lower mast; it is also steadied by a double cap G, separately shown in fig. 3, on which it fids finally on the top. The top-gallant mast H is fixed to the mast F by the top and cap in the usual manner. The figures 2 and 3 show the caps separated from the masts, and are the only things necessary to be made for the purpose; and the object of the cap, fig. 2, is to steady and prevent any wringing of the lower jury mast, and to fid the top mast whenever it is reefed. The fore top mast F F appears in two separate pieces, on account of its length.

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The SILVER MEDAL *of the Society was this Session voted to Captain* H. L. BALL, *of the Royal Navy, for an Improvement in Anchors, to render them more durable and safe for Ships, and for his Improved Mode of Fishing Anchors. The following Communications were received from him, explanatory Engravings are annexed, and Models are preserved in the Society's Repository.*

SIR,

THE great expense of timber in the navy for anchor stocks, and the frequency of their failing or giving way in the centre, where the square of the anchor is let into the stock, have induced me to offer to the Society of Arts, &c. a plan of an anchor which may be cheaper in construction, and more likely to hold in various situations than those in common use.

The model I have sent will sufficiently explain my intention, and show how beneficial it may be in strengthening the anchor stocks. I wish much to notice to you its probability of holding in the ground longer than other anchors, on account of the additional weight of the stock; and this will more particularly be the case in banks which shelve suddenly down from the shore, such as at St. Helena, Cawsand Bay, and indeed in most of the islands in the West Indies. The proportion of additional iron, as explained by my model, is in all anchors to be twice and a half the diameter of the shank from each side at the stock, and of course this mode will supply the place of the present nuts, which are only intended to prevent the stock from slipping in

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in and out, whenever it becomes loose, which accident anchors are very liable to in hot climates. My anchor stocks will save a considerable quantity of the finest timber, and give much greater security.

I likewise beg leave to offer to the Society a model of a double fish hook, for the purpose of fishing the anchor, an operation which, in the common mode of doing it, is frequently attended with accidents both to the ship and crew, from the anchor suddenly slipping unexpectedly in raising it to its proper position.

I flatter myself that these improvements will meet with the Society's approbation.

I am, Sir,

Your most obedient humble Servant,

H. L. BALL.

Lower Mitcham, Feb. 13, 1808.

To C. TAYLOR, M. D. SEC.

Reference to the Engravings of Captain H. L. BALL's *Method of Fishing an Anchor. See Plate II. Figs.* 4 *and* 5.

Fig. 4, Pl. 2, represents Captain Ball's method of fishing an anchor. Fig. 5 shows an enlarged view of his double hooks used for that purpose.

In the usual operation of heaving an anchor, it is drawn up by the cable until it appears above water; the cable will not now raise it higher, it is therefore bowsed up by the cat block *a*, fig. 4, from the cat head *b*, the cable *d* being slackened out as it rises. When it is got up as high as the cat block will raise it, a strong hook, called the fish hook,

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fastened to a rope *e*, which is suspended by a tackle from the shrouds, is hooked to the anchor at the bottom of the shank, and thus the arms of the anchor are elevated above the stock, until one of the flukes is brought up to the timber heads *f f*, to which it is made fast by a rope and chain, called the shank painter. In this operation the fish hook sometimes slips and occasions mischief, to remedy which, Captain Ball has applied two hooks instead of one, which keep firmer hold. These hooks are shown upon an enlarged scale at *g g*, fig. 5, attached to the rope *e*; each of these hooks take one of the arms of the anchor, close to the shank, and hold it firmly. *i i* are two small lines made fast to the hooks, to direct them so as to get proper hold of the anchor.

Reference to the Engraving of Captain H. L. BALL'S *Improvement in the Formation of Anchors. See Plate II. Figs.* 6, 7, *and* 8.

This anchor, in external appearance, differs very little from the common anchor; the improvement consists in forming and fixing of the shank of the anchor to the stock. The stock *a a*, figs. 6 and 7, is made of two pieces of oak bolted together, and well secured by hoops. In the common method, in order to prevent the anchor stock from slipping off the shank, a square projection *b b*, fig. 8, is forged upon the shank; this is improved by Captain Ball, as shown in fig. 6, where this projection *d d* is extended on each side of the shank, far enough to receive two bolts through each of these extensions, which bolts hold firmly together the two pieces of timber which form the stock, and secure the stock fast to the shank. Two iron hoops,

fig.

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fig. 7, *e e*, are driven on the stock between the bolts, and *f f f f* are other hoops, and *g g g g* are tree-nails to strengthen the whole.

The SILVER MEDAL *of the Society was this Session voted to* Mr. THOMAS ROBERTS, *of the Navy Office, for his Improvement in Ship Building, by securing the Ends of the Beams of Ships without Wooden Knees. The following Communications were received from him, an explanatory Engraving is annexed, and a Model and Drawing are preserved in the Society's Repository.*

SIR,

I BEG leave to send you herewith a sketch of the midship section of a 74 gun ship, showing a more effectual method of securing the beams of ships to their sides, and for superseding the necessity of standards, top and breadth riders, and nearly of wood knees altogether, which, after repeated trials, have been found fully to answer the intended purpose, and for which invention I have been rewarded with a premium of 800l. by the King's Order in Council of the 18th of October last, on the recommendation of the Lords of the Admiralty, and the Honourable Commissioners of his Majesty's Navy, which I wish to be laid before the Society of Arts, &c. if you think the merits of it worthy their notice. As the subject has not been published, I hope it will appear deserving of some mark of the Society's approbation; and in order to show that it is not a speculative

business: I beg leave to subjoin a list of ships that have been built, and are now building, agreeably to this mode.

I am, Sir,

With the greatest respect,

Your humble servant,

THOMAS ROBERTS.

Navy Office, May 3, 1808.

To C. TAYLOR, M. D. SEC.

A List of Ships Built and Building for his Majesty's Service, whose Beams are secured on a Plan proposed by Mr. THOMAS ROBERTS, *Assistant Surveyor of his Majesty's Navy.*

BUILT.

Ships' Names.	*Guns.*
Lively	38
Melampus	36
Jason	32
Hebe	32
Circe	32
Pallas	32
Alexandria	32
Thames	32
Resistance	38
Spartan	38
Undaunted	38
Valiant	74
Elizabeth	74
Cumberland	74
Venerable	74
Alcmêne	74

NEARLY

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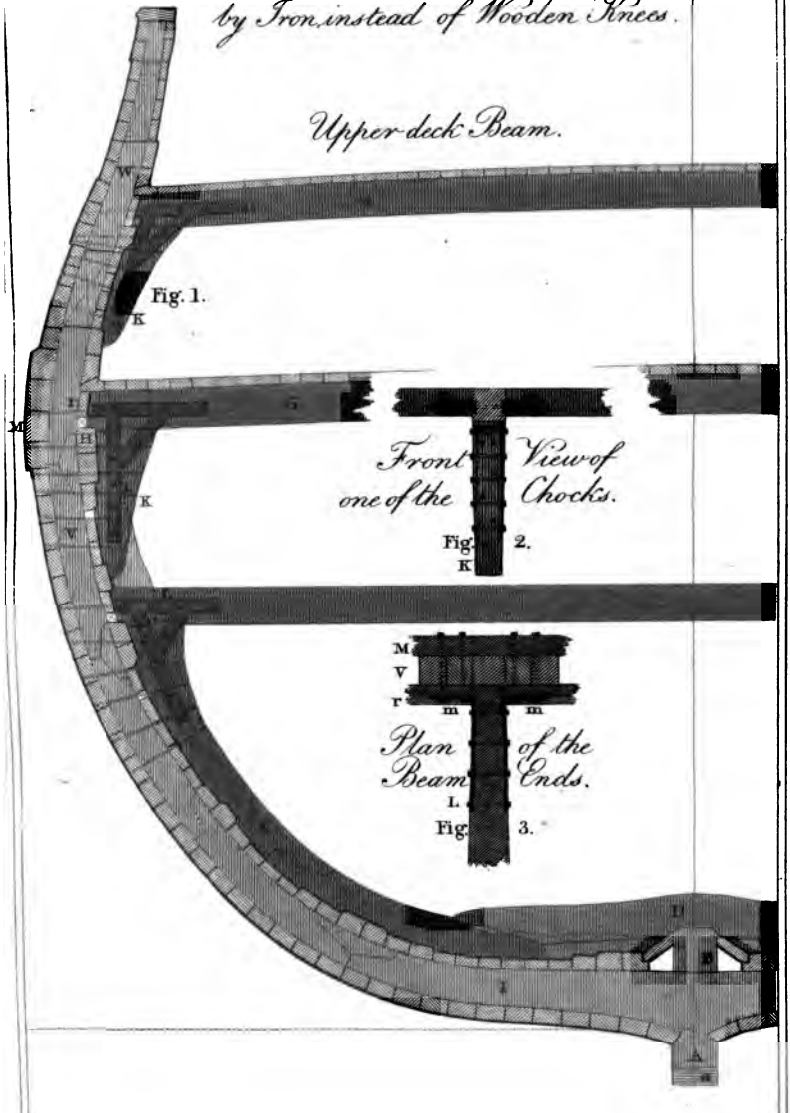
Mr. T. Roberts's Method of attaching the Ends of the Beams of Ships, to their Sides by Iron, instead of Wooden Knees.



J. Farey jun.r del.

Engraved by S. Porter.

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NEARLY COMPLETE.

Ships' Names.	Guns.
Caledonia	120
Milford	74
Cornelia	32
Nereus	32
Bucephalus	36
Semiramus	36
Dolphin	44

BUILDING.

Ajax	74
Conquestadore	74
Vigo	74
America	74
Berwick	74
Vengeur	74
Scarborough	74

Reference to the Engraving of Mr. ROBERTS' *Method of applying Iron Knees to connect the Ends of the Beams to the Sides of Ships, Pl. III. Figs.* 1, 2, *and* 3.

Fig. 1. the one half of a midship section of a large ship. A is the keel, with the false keel *a* beneath it. B the kelson, D chocks bolted thereto, to retain the opposite pieces of the riders E firmly together; F one of the orlop beams, G one of the lower deck beams, and *d* one of the upper deck beams; H are the clamps which sustain the extremities of the beams, I the floor timbers laid across the keel and bolted to it, V the several futtocks, and W the top timbers, which are all united into one frame. K are the wooden chocks bolted to the ship's sides, and L are the iron

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knees by which the beams are made fast to the chocks; these knees are also bent and bolted to the ship's sides, as shown by L *m m* in figs. 2 and 3. In fig. 3, which is a plan of the beam ends, M is the outside plank, V the timbers, and *n* the filling between the timbers.

The bolts for the chocks and iron knees go through all these as shown by the dotted lines. The dimensions of the iron knees are as follows:

Upper deck flat iron knees, breadth four inches and a half, thickness one inch.

Lower deck iron knees, breadth five inches, thickness one inch and an eighth.

Orlop iron knees, breadth five inches, thickness one inch and an eighth.

CERTIFICATES.

SIR,

We feel ourselves called upon by a strong sense of the necessary attention due to the merit of an individual, to state to you, for the information of the Right Honourable the Lords Commissioners of the Admiralty, the great utility which has resulted to his Majesty's service, from a method of fastening the beams of ships to their sides, to which resource we have found it absolutely neeessary to resort, from a general failure of the supply required of wood knees.

This contrivance is the invention of Mr. Roberts, assistant surveyor of his Majesty's navy, and has been found, after repeated trials, to answer the purpose for which it was intended. We consider it as an object of great importance in ship building, and we therefore beg leave to recommend

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commend to their Lordships' consideration, that a premium, (such as may in the judgment of their Lordships be a just reward for an invention of so much utility), be granted to Mr. Roberts, as a reward for his thus contriving a substitute so beneficial, and as an encouragement to others, to exert their inventive powers in producing works of similar worth.

We remain, &c. &c. &c.

THOS. B. THOMPSON.
W. RULE.
HENRY LEGGE.

Navy Office, Sept. 27, 1806.

To WILLIAM MARSDEN, ESQ.

At the Court at the Queen's Palace, the 28th October, 1807.

PRESENT

The King's Most Excellent Majesty in Council.

WHEREAS there was this day read at the Board, a Memorial from the Right Honourable the Lords Commissioners of the Admiralty, dated the 27th of this instant, in the words following, viz.

May it please your Majesty,

The principal Officers and Commissioners of your Majesty's Navy, having represented to us, by their letter of the 27th September, 1806, that they felt themselves called upon by a strong sense of the merits of an invention of Mr. THOMAS ROBERTS, assistant to the Surveyors of your Majesty's Navy, for fastening the beams of ships to their sides, to which expedient it was found absolutely necessary

to

to resort, from the general failure of the supply required of wooden knees, to represent that the invention has been found, after repeated trials, to answer the purpose for which it was intended; and is considered as an object of great importance in ship building.

And the said principal Officers and Commissioners having, by their letters of the 20th and 24th of this month, confirmed their former opinion of the utility of the contrivance, and after earnestly recommending that some reward should be granted to Mr. Roberts, set forth they are of opinion the sum of eight hundred pounds will be a proper recompense.

We have taken the same into our consideration, and concurring in opinion with the Navy Board as to the ingenuity of Mr. Roberts' invention, and the advantages that may reasonably be expected to be derived from it, do most humbly propose to your Majesty, that your Majesty will be graciously pleased to authorise us to direct the Commissioners of your Majesty's Navy, to present him with a sum not exceeding eight hundred pounds, as a reward for the same.

His Majesty having taken the said memorial into consideration, was pleased, by and with the advice of his Privy Council, to approve of what is therein proposed:—And his Majesty doth hereby authorise the Lords Commissioners of the Admiralty to direct the Commissioners of his Majesty's Navy to present the said Mr. Thomas Roberts with a sum not exceeding eight hundred pounds, as a reward for the invention.

W. FAWKENER.

(A Copy.)

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The SILVER MEDAL *of the Society was this Session voted to Major* CHARLES LE HARDY, *of the Island of Jersey, for his Invention of a Telegraph. The following Communication was received from him, an explanatory Engraving is annexed, and a complete Working Model is preserved in the Society's Repository.*

SIR,

HAVING discovered a mode of communicating by signals, which to me seems to unite every advantage that can be expected for that mode of communication, I beg leave to transmit to you a plan of it, and to write a few explanatory lines upon the subject.

The telegraph, of modern invention, is an improvement on communication by signals, which has been in use for many ages. Monsieur Chappe was, I believe, the first who proposed a machine for that purpose, which was put in execution about the year 1793. Since that time several modes have been proposed by different persons, none of which seem to have fully attained the object. A machine of this kind should be simple and easy to comprehend. All those which have come to my knowledge are executed by combinations, which render them too complicated for common use, and therefore liable to many errors. That which I now submit to your consideration, seems to me to have removed every objection of the kind; it is simple, easy to comprehend, and extensive in its means; its combinations, which by simple numeration may be carried to 40,000, might with ease be extended to almost infinite numbers;

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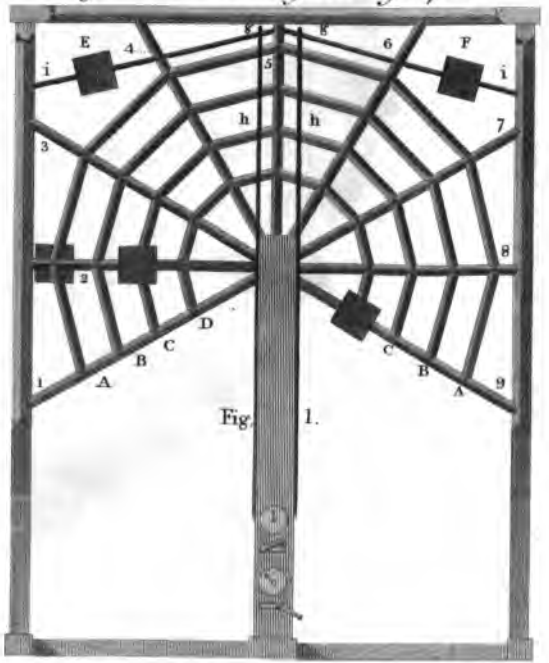
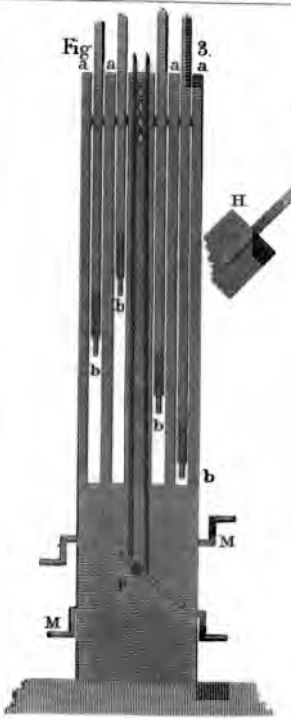
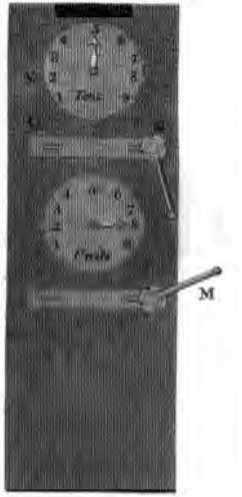
Major C. Le Hardy's Telegraph.





Index.

Fig. 4.



Engraved by S. Porter.

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London, Jan. 13,

To C. TAYLO

Reference to the Engraving of Major C. LE HARDY'S *Telegraph. See Plate IV. Figs.* 1, 2, 3, *and* 4.

This machine is intended to express numbers, which may be seen at a distance, and to which words may be referred at pleasure.

Fig. 1 represents a front view of the machine—it is composed of nine bars or radii, answering to the nine figures of arithmetic, as numbered in the plate. The four polygonal or concentric bars, A. B. C. D. which intersect the radii, are for the decimals; thus A stands for units, B for tens, C for hundreds, D for thousands. Over each of these concentric bars or circles, an index, as that marked H, fig. 2, traverses, which marks the number of thousands, of hundreds, of tens, and of units, as far as ten thousand; for instance, if it is required to make the number 9202, turn the hand H in the circle D of thousands to the radius 9, then the hand H in the circle C of hundreds to the radius 2, then, as there are no tens, turn the hand to the radius 2, upon the circle A of units; but as ten thousands are not sufficient to express the number of words in the English language, two square boards are added in the corners, of which that marked E is equal to 10,000, that marked F to 20,000, and both being shown together, are equal to 30,000, which, with the numbers made on the circles, bring it up to 40,000, which number is more by many thousands than all the words in the English language.

Fig. 2 is a view of the mechanism which works the round: this is done by means of a rack wheel at I, ch is firmly fixed the hand with its signal board el is made to revolve by means of a rack L, which

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The SILVER MEDAL *of the Society was this Session voted to the* CHEVALIER A. N. EDELCRANTZ, *President of the Academy of Arts, and Superintendant of his Swedish Majesty's Buildings in Sweden, for a Telegraph of his Invention. The following Communications were received from him, an explanatory Engraving is annexed, and a complete Working Model is preserved in the Society's Repository.*

DEAR SIR,

SINCE I left London two years ago, my time, by different occupations, has been almost drawn away from those pursuits which were formerly the dearest objects of my attention, and which procured me the honour of being elected a member of the Society of Arts, &c.

Nothing, however, Sir, shall interrupt those sentiments of gratitude or respect which I owe to the Society, and which, on every occasion, I shall be happy to prove.

I have sent, by Mr. MURRAY, of Leeds, a model of the telegraph which I contrived in Sweden twelve years ago, and which since that time has been in constant use on both sides of the Baltic, besides other places in this country. Its office near the Baltic consists chiefly in facilitating the communication of posts between Russia and Finland on one side, and Sweden and England on the other; and in that respect I dare flatter myself that it has not been quite useless to your country. I shall esteem it a favour if the Society will accept the model I have sent, with two printed publications descriptive of this machine, one in the Swedish, the other in the French language, as a small proof of my respect

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Stockholm, Nov. 25

To C. Taylor,

Dear Sir,

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the numbers of a table, previously constructed, and referred to by the signals.

It is necessary that the telegraph should be placed above the level of the horizon, to prevent any object behind from rendering the vanes obscure. The vanes should be painted black, and the intervals between them greater than their diameters, that the vanes may be more clearly distinguished. The frames which support the vanes should be painted white or red, in order to make a better distinction betwixt them, and to show the vanes more clear.

One person is sufficient to manage a telegraph constructed on my plan, particularly at the two extreme ends of the stations, and when the telescope, as should always be the case, is fixed so near to the person who works the telegraph, that he may, at the same time, look through it, and also work the vanes; but for greater certainty, and for intermediate stations, where observations should be made with two telescopes, and in contrary directions, there should be two persons to relieve each other occasionally in the observations; this will require no particular genius, for any person will be capable to manage the business, who knows how to write numerals, and to add together 1, 2, 3, 4.

In trials which I have made for a year and a half, I have frequently employed children, who in a few hours have been sufficiently instructed, and capable of practice.

It is with this view that I have, in the construction of my telegraph, made some sacrifice in its power, to its simplicity of practice. In the working of my telegraph, six signals are usually given in one minute. For a more explicit explanation of this subject, I refer you to the two following publications, entitled, *Abhandlung om Telegrapher och Försök til en ny Inrättning däraf*, in the Swedish language, 1796, and *Traité des Télégraphes, et Essai d'un nouvel*

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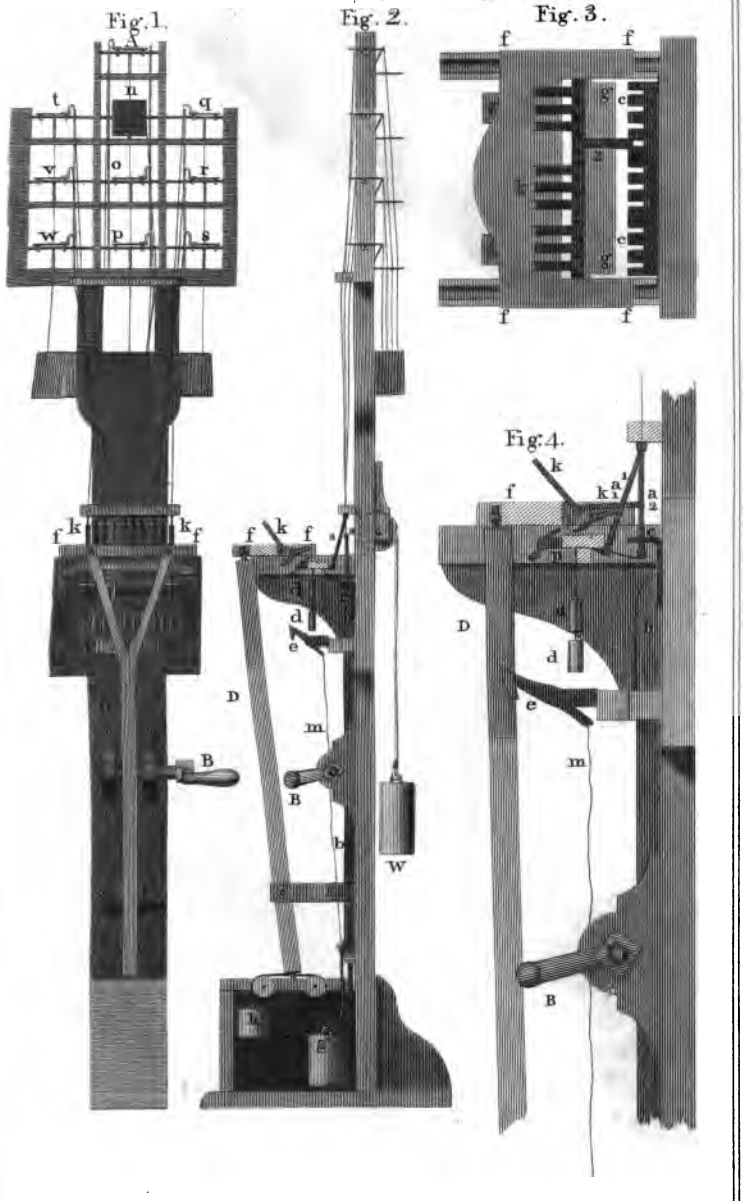
Sir A. N. Edelcrantz's Telegraph.



J. Farey, jun. del. Engraved by S. Porter.

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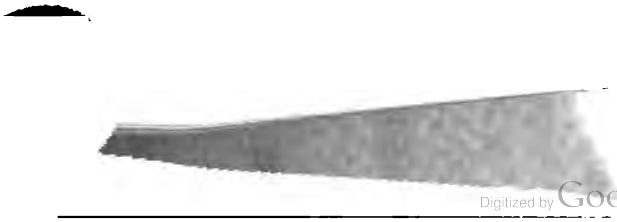
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Stockholm, July 1

To C. TAYLOR,

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b is a wooden bar, which is drawn downwards by a rope coiled round a barrel turned by the winch B, and upwards by means of a weight W, fig. 2. The upper end of the bar *b*, has a piece of iron plate c, (a plan of which is seen in fig. 3), into which are cut slits to receive the rods *a a* above their lower knobs; and thus when the handle B is turned, it draws down the rods *a a*, and moves the signal boards, as shown at *n*, fig. 1. Each of the rods *a a*, has a small string and weight *d* attached to it by means of its lower screwed button, the action of which causes the rods to assume the position *a* 1, fig. 4; in this situation they are clear of the range of the iron plate *c*, and will not be affected though it is moved up and down. f f and c, (in all the figures, and seen in plans in fig. 3), is a frame sliding in grooves to and from the rods *a a*; it is moved by a lever D, which receives its motion in the following manner; a weight g, fig. 2, is fastened by a short rope to the end of the bar *b*, it is also tied to a rope which passes over a pulley, is then fastened to the end of the lever D, goes over another pulley, and has a weight *h* suspended from it; now, when the bar *b* is drawn up, it takes the weight *g* with it, the weight *h* then acts upon the end of the lever D, and throws the frame *f f* towards the rods *a a*; upon the descent of the bar *b*, the weight *g* is thrown upon the small rope, and as it is heavier than *h* is, draws it up, and moves the frame *f* from the rods *a a*. The frame *f f* has a spindle in it, upon which are mounted ten keys *k*, and which have angular gaps or notches in their ends, answering to the intervals of the rods *a a*. These keys are marked with figures, each denoting the signal board, whose rod *a a* is opposite to it; the keys turn on the spindles, and when turned up as k, in figs. 2, 3, and 4, are not in use, and do not affect the machine; but when any particular one is thrown down, as z, fig.

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z, fig. 3, it pushes before it, in its angular notch or cleft, that rod *a* 2, fig. 4, which is opposite to it, into the correspondent slit in the plate *c*, as represented in fig. 4; a latch *e* catches the lever D, and prevents its return, though the bar b is drawn down by the handle A taking the rod *a* 2 with it, and making the signal; when the bar b arrives at the bottom of its motion, a wire *m* made fast to the end of the bar *b*, and to the tail of the latch *e*, raises the latch and allows the weight *g* to draw back the lever D and frame *ff*, into the position fig. 2; in its motion a small catch *p*, fig. 4, seizes a tail upon the plate *g*, (figs. 3 and 4,) which moves upon pivots in the frame *ff*; and as the frame recedes from the rods *a a*, the catch raises up the plate *g* upon its pivots, and thus lifts up all the keys which are in the position k 1, and puts them in the position *k*, ready for another signal. The great advantage of this contrivance is, that by the powerful leverage afforded by the winch and barrel, one man is enabled to move any number, or even the whole of the shutters at once, and to retain them in that situation, be the weather ever so boisterous, until the signal is answered; which is the more necessary in this telegraph, on account of its greater number of vanes or indexes; but which cannot be done in the government telegraphs in England, even with their more limited number of vanes, without employing several persons at each telegraph.

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The SILVER MEDAL *of the Society was this Session voted to* MR. ROBERT RICHARDSON, *of Keswick, in Cumberland, for his Method of raising large Stones out of the Earth. The following Communications were received from him, an explanatory Engraving is annexed, and one of the Implements is preserved in the Society's Repository.*

GENTLEMEN,

I, ROBERT RICHARDSON, of Keswick, in the parish of Crosthwaite, and county of Cumberland, beg leave to inform you, that I have found out a method of taking large self-stones out of the ground in a very expeditious manner, and that by this means two men will take as many stones out of the ground in one day, as would require twelve men in the usual way of blasting, and afterwards using large levers, &c.

Where stones of from two to four tons each are to be taken up, two men will raise as many as twenty men in the usual way. The work is done by the power of a tackle, but by my method of fixing the tackle to the top of the stone, by the plug which I have invented, it will hold till the stone is pulled out of the ground, and laid upon the surface, or upon a carriage, if required, all which can be done in a very little time.

Stones of four tons weight, or upwards, may be taken out of the ground within the time of five or ten minutes, by two men, without any earth or soil being previously taken from around them, or without any digging with hacks or spades. J. C. CURWEN, Esq. of Workington, has

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Mr. Richar

Fig

Front view

Fig. 2.

J. Barry Junr. delin.

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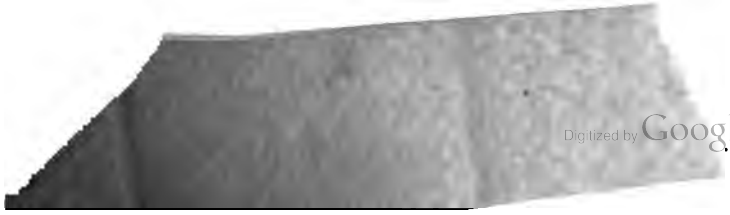
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for soft stones, or safe to use for raising stones in buildings, it being so easily disengaged by any lateral blow. By adding wheels to the tackle machine, or having it upon a sledge, a great deal of time and trouble would be avoided. I purpose to employ this method next summer in making an embankment against the sea; the facility it will give in raising and removing large stones, will expedite the work greatly. If any further certificates of the performance of this plug be required by the Society, I will with pleasure transmit them to you. I will answer for its extracting any stone not exceeding five tons weight out of the ground, without any previous moving of the earth; and it is of importance to preserve large stones entire.

I am, with respect, dear Sir,

Your obedient humble Servant,

J. C. CURWEN.

Workington Hall, Feb. 19, 1808.

To C. TAYLOR, M. D. SEC.

SIR,

I AM favoured with your letter, desiring my opinion of the utility of the iron plug invented by ROBERT RICHARDSON, of Keswick. That which I use is about six inches long, and one inch and a quarter in diameter; it requires a hole of its own size, only two inches deep; the plug is to be driven in a little short of the bottom, and will raise a stone of six or eight tons, with the assistance of three men, in the course of ten minutes after the hole is prepared; and I do not hesitate to say, that three men, thus furnished, will

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will clear the ground of large stones in less time, and more effectually, than twelve men by any other method yet come to my knowledge. The plug should be made of good beaten iron. The simplicity and cheapness of the whole apparatus is a great object, as a good plug of the size I use will only cost two shillings and sixpence. I am fully of opinion, that by adding more and stronger ropes and pullies, work might be done by it to an amazing extent. I have reaped great advantage in my farm from the aid of the iron plug, and in justice to the inventor, am happy in thus vouching for its extreme usefulness. Several of my respectable neighbours have experienced the aid and benefit of the above instrument, and will vouch, if required, for the truth of the above statement.

I am, Sir,

Your truly obedient Servant,

ROBERT WRIGHT.

Rose Gill Hall, near Shap, Westmoreland,
May 9, 1808.

To C. TAYLOR, M. D. SEC.

Reference to the Engraving of MR. RICHARDSON'S *Invention for raising large Stones out of the Earth. See Pl. VI. Figs.* 1, 2, 3, *and* 4.

Fig. 1, K, shows the upper part of a stone nearly buried in the earth, having a hole made in it three inches and a half deep, and one inch in diameter, by means of a miner's jumper; the cylindrical tail of the plug *a*, figs. 2, 3, and 4, which is of the same size, is driven fast into it, by means of

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of a hammer applied upon the head of the plug at G. This plug, in its whole length, is nine inches, and has a hole made in its broad part H, through which the oval iron ring B passes easily, and on which the plug can move backwards and forwards, when the ring is hung upon the hook of the lower pulley block of the lifting tackle. C C C C represent the four legs or frame work of the quadrangle; D a five-fold tackle, with blocks ten inches in diameter; E a roller seven inches in diameter, turned by two long iron levers b b; the handle I is used as a safeguard, and to assist to regulate the power of the levers. In fig. 1, the plug A is shown fixed in the stone K, ready to draw it out of the ground, by means of the lifting tackle.

N. B. The hinder legs of the quadrangle are made to close in between the fore legs, for the convenience of carriage.

The following Communication was received from MR. GILBERT GILPIN, *Old Park Iron Works, near Shifnal, relative to his Machine for raising Coals, described in page 74 of the 25th Volume of Transactions,*

SIR,

I AM sorry to see in the 25th volume of the Transactions of the Society of Arts, &c. that the engraver has in the plate put the wrong side of the machine for raising coal and ore to face the pit. Upon that plan the engine house would be between the machine and pit, and direct in the way of the chain. The cranks should face the opposite way.

There

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There is also an error of the press, page 78, in describing the size of the cross section of the tire, which renders a confusion in the 11th, 12th and 13th lines. It ought to run thus, beginning at line 8:

"The wrought iron tire is of two kinds, the one for "conical, and the other for cylindrical barrels; the cross "section of the former is nearly a parallelogram*, out of "the upper part of which about one fourth of an ellipsis is "taken, to form a horizontal bearing for those links of "the chain which lie flat upon the tire; the cross section "of the latter is a rectangle†."

I mentioned that I wished the manuscript which I first sent, to be superseded by that which I sent afterwards, but the following passages in pages 78 and 79, I find to be printed from the former, viz.

"It is probable, therefore, that in this manner of work-"ing, chains will last at least fifteen years, but to be cer-"tain we will take it at twelve in the subjoined compara-"tive statements, which show that the expense of chains "as cordage is only about a twenty-fourth part of that of "hempen ropes."

The comparative statement is printed from the last manuscript, (which was varied from the first one, to do away some objections of ropemakers, in regard to durability of ropes,) by which it appears, the expense of chains, as cordage, is only about a fourteenth part of that of ropes. I am pretty certain they will not be even one twenty-fourth of the expense; but it is necessary to correct the error which has arisen in the statements, from combining parts of each of the letters.

* One inch and a quarter, by 5-8ths of an inch.

† One inch and a quarter, by half an inch.

I purpose

I purpose to transmit to the Society a description of an improved machine, which is likely to be of much importance on board men of war and Indiamen.

I am, Sir,

Your obliged humble Servant,

GILBERT GILPIN.

Old Park Iron Works,
July 6, 1808.

To C. TAYLOR, M. D. SEC.

FIVE GUINEAS *were this Session voted to Mr.* JOHN TAD, *of Little Hermitage, Wapping, for a Method of Preventing Doors from Dragging on Carpets. The following Communication was received from him, an explanatory Engraving is annexed, and a Model, showing this Invention, is preserved in the Society's Repository.*

SIR,

I HAVE taken the liberty of laying before the Society a model of my invention to prevent doors from dragging on carpets, and to keep out the current of cold air, which enters under such doors as are not close to the carpets underneath them.

I can affix this machinery to the bottom of any door, so that the door shall pass over the carpet with ease, and, when shut, be air tight. It obviates the necessity of screw rising hinges,

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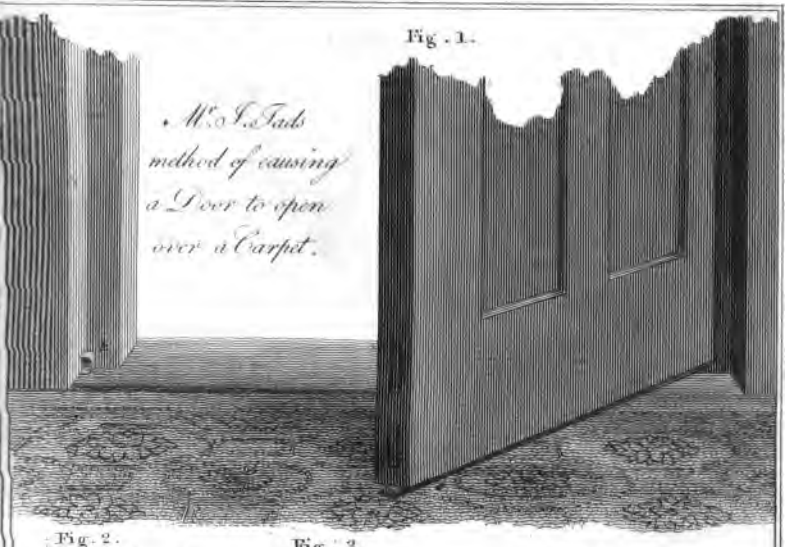
Fig. 1.



Mr. I. Tait's method of causing a Door to open over a Carpet.

Fig. 2.

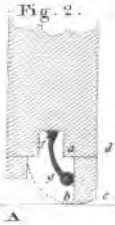


Fig. 3.

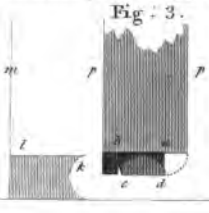
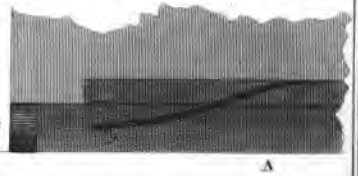


Fig. 4.



Mr. W. Barlow's Wrench for Screw nuts of any size.

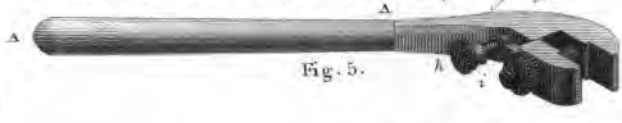


Fig. 5.

Section

Enlarged view of the head

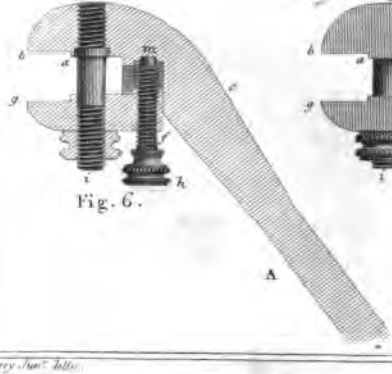


Fig. 6.

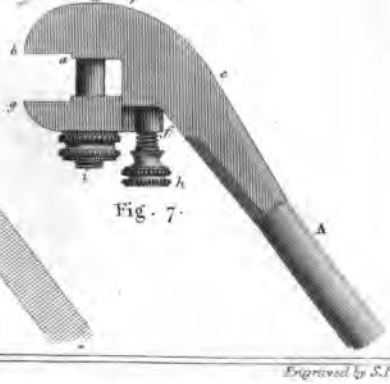


Fig. 7.

T. Barry Junr. delin.

Engraved by S. Porter.

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same purpose.

The machinery i
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slip is one and a qu
and to be covered
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circular piece of ha
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floor or carpet, so
it. Hoping this in
of the Society, I re

No. 4, Little Hermitage S
Nov. 24, 1807

To C. TAYLOR, M

A Certificate was
No. 280, Wapping,
two of his room doc
that he found it to a
mitting the doors to
ing out the air.

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Reference to MR. TAD'S *Method of preventing Doors from Dragging on Carpets. See Pl. VII. Figs.* 1, 2, 3, *and* 4.

MR. TAD'S invention consists in first cutting away the bottom of the door, so that it is about one inch and a quarter above the floor; this allows a sufficiency of room for the door to open over any carpet; to close the opening which would now be left under the door when shut, he proposes to fix beneath the door, by means of hinges, a slip of wood, of which *a b d e*, figs. 2 and 3, Plate VII. is a section. Fig. 1 is a perspective view of the bottom of a door, with the invention annexed to it; fig. 2 is a section across the door when closed; fig. 3 is a view of the edge of the door when open; and fig. 4 is a section supposed to be made by cutting the door in two parts, edgeways. The hinges, on which the slip turns, are fixed to the edge. In figs. 2 and 3, from *a* to *b*, is exactly one inch and a quarter, so that when the ruler is turned down upon the hinges, it reaches the floor A A as in fig. 2; in the other direction *a d* it is much less, being only half an inch, so that when it is turned up under the door, as in fig. 3, it leaves three quarters of an inch clear of the floor. It now remains to show how the ruler is turned up or down; it has always a tendency to rise up into the state of fig. 3, by the action of a steel wire spring, shown in figs. 2 and 4, which is concealed in a rebate cut in the bottom of the door; one end of the wire is screwed fast to the door at *f*, the other is inserted into an eye fastened into the slip at *g*, to throw it down into the position of figs. 2 and 4. The end *h*, fig. 4, of the slip farthest from the hinges of the door, is cut into a semicircle, as seen in fig. 3. When the door is just closed, this semicircle is received into a fixed concave semicircle *k*, fig. 3, cut in the end of a piece of wood *k l*, made fast

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fast to the door case; the line *m l*, fig. 3, represents the plane of the door when shut, and *p p* part of the door seen edgeways; as the door in shutting moves from *p* to *m*, the semicircular end of the slip *a b d e* presses against the end of the piece *k l*, and as the door proceeds, it turns down as in fig. 2, so that by the time the door is shut, the slip is turned quite down; the edge *e b* of the slip is cut into a segment of a circle struck from the hinges on which it turns. The perspective view in fig. 1 shows that this contrivance, applied to any door, will not offend the eye, as it can scarcely be distinguished from an ordinary door. *K*, fig. 1, shows the concave semicircle of the piece of wood fastened to the door-case, in which the semicircular end of the slip *e* is to be received.

FIVE GUINEAS *were this Session voted to Mr.* WILLIAM BARLOW, *of his Majesty's Dock Yard, at Portsmouth, for an Improved Screw Wrench to fit different sized Nuts or Heads of Screws. The following Communications were received from him, an explanatory Engraving is annexed, and the Instrument is preserved in the Society's Repository.*

DEAR SIR,

I SEND you a screw wrench, from the inventor, WILLIAM BARLOW, with his observations upon it. I have employed him as a foreman during the erection of the block machinery in his Majesty's Dock Yard, at Portsmouth.

If this very useful instrument should meet with the approbation of the Society of Arts, &c. I shall beg leave to recommend

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recommend the inventor to their notice, as an intelligent and ingenious person, who is deserving of their encouragement.

I am, dear Sir,

Your obedient humble Servant,

M. J. BRUNEL.

No. 21, Cheyne Walk, Chelsea,
March 7, 1808.

To C. Taylor, M. D. Sec.

SIR,

Permit me to make a few observations on a shifting screw wrench of my invention, which I beg leave to lay before the Society of Arts, &c. through the hands of Mr. Brunel, inventor of the block machinery here.

I have found, from long experience, the imperfections of the various wrenches in common use, for the screw heads and nuts of engines in general, which are often materially injured for want of an instrument which would fit variety of sizes, and be applied with as much advantage as a solid wrench. I have had it in view to unite steadiness with conveniency in making such an instrument, and flattering myself that I have obtained both, I am desirous to communicate my invention to the Society, and have therefore sent an instrument on the principle I have actually used, and which has met with the approbation of my employers and other persons.

This wrench, by means of a nut and screw, is adjusted with the greatest ease to the exact size required, and in that state rendered so steady that in use it is found equal to a solid wrench.

I have,

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I have, for several years, been intrusted with the care and repairs of many valuable engines of various descriptions, composing the block machinery in this dock-yard, and I have always considered it as an object of great importance, for the preservation and neat appearance of engines, to attend to all the means which would obtain these advantages, and such, I think, will arise from the use of my universal wrench.

It is, perhaps, unnecessary to point out, that a wrench on this principle, may be varied in its form and size so as to be rendered probably more convenient for some particular purposes for which such instruments are required.

I am, Sir,

Your obedient Servant,

WM. BARLOW.

Portsmouth Dock Yard,
March 1, 1808.

To C. TAYLOR, M. D. SEC.

Reference to the Engraving of Mr. BARLOW's *Improved Wrench. See Plate VII. Figs.* 5, 6, *and* 7.

This instrument is represented in Pl. VII. Fig. 5 is a perspective view of it; fig. 6 a section of its head; and fig. 7 an external representation of the head. The screw head or nut to be turned is held between two jaws, one of which *a b d e* is forged in the same piece with the handle A A, the other, *f g*, is moveable between two chukes, and fastened to the fixed jaw by the strong screw *i*, which is fixed to the same jaw, passes through the moveable one, as shown in the section fig. 6, and has a nut screwed upon it; the

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other screw *h*, is tapped through the moveable jaw, and its point presses upon the bottom of a cavity made in the fixed jaw shown at *m* in the section fig. 6. To make the wrench fit any particular screw head or nut, the nut upon the strong screw *i* must first be loosened, and the screw *h* screwed in or out of the moveable jaw, until the opening *b g* is just the proper width to receive the screw head or nut to be turned by the wrench; the nut of the screw *i* is then to be screwed down, until it presses upon the jaw, and holds it perfectly tight.

The THANKS *of the Society were this Session voted to* MR. SAMUEL CLEGG, *of Manchester, for his Apparatus for making Carbonated Hydrogen Gas from Pit Coal, and Lighting Factories therewith. The following Accounts were received from him, an explanatory Engraving is annexed, and Drawings are preserved in the Society's Repository. A* SILVER MEDAL *has since been voted to him for the Communication.*

DEAR SIR,

WHEN your son was in Manchester, he called to see my nephew's, SAMUEL CLEGG's, improved gas lights, and was desirous to have a plan of his method, which my nephew promised to him, and I undertook to get it conveyed to you. I have, accordingly, taken the opportunity of sending to the Society of Arts, &c. a plan and explanation of his apparatus.

He lighted a large factory in Yorkshire some years ago upon this principle, and has since lighted some buildings in

in this neighbourhood, and I believe he is the first person who succeeded in rendering these lights free from the offensive smell which generally accompanies them. My nephew served an apprenticeship to Messrs. Boulton and Watt, of Birmingham, in the steam-engine business, in which he is now engaged here on his own account, and has made considerable improvements in their construction.

I remain, dear Sir,

Your most obedient Servant,

ASHWORTH CLEGG.

Manchester, May 18, 1808.

To C. TAYLOR, M. D. SEC.

SIR,

YOUR esteemed favour I have received, and, according to your request, have sent you a fuller explanation of the gazometer and lamp, accompanied with further drawings.

A gazometer, containing seven hundred cubical feet of gas, weighs about twenty hundred weight, and costs about two pounds ten shillings the hundred weight.

The whole of an apparatus complete, capable of supporting forty lamps for four hours, each lamp affording light equal to ten candles of eight in the pound, will cost about two hundred and fifty pounds. Each lamp consumes six cubical feet of gas per hour. I am happy to find that the Society have honoured my communications with their attention, and I remain, with great respect,

SIR,

Your most obedient Servant,

S. CLEGG.

Manchester, Aug. 12, 1808.

To C. TAYLOR, M. D. SEC.

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Reference to Mr. S. Clegg's improved Apparatus for extracting Carbonated Hydrogen Gas from Pit Coal. See Plate VIII. Figs. 1, 2, 3, 4, 5, and 6.

In fig. 1, *A* shows the cast iron retort, into which are put the coals intended to be decomposed by means of a fire underneath it, the heat of which surrounds every part of it excepting the mouth or part by which the coals are introduced. The lid or iron plate *B*, which covers the mouth of the retort, is ground on air tight, and fastened by means of a screw in the centre; *C* is a shield or saddle of cast iron, to preserve the retort from being injured by the intensity of the fire underneath it, and to cause it to be heated more uniformly. *D D D* represents the cast iron pipe which conveys all the volatile products of the coal to the refrigiatory of cast iron *E*, in which the tar, &c. extracted from the coal is deposited, and from whence they can be pumped out by means of the copper pipe *F*. *G* is the pipe which conveys the gas to the top of the cylindrical vessel or receiver *H*; this receiver is air tight at the top, and consequently the gas displaces the water in the vessel *H*, to a level with the small holes, where the gas is suffered to escape and rise through the water of the well *I*, into the large gazometer *K*. The use of the vessel *H* is pointed out as follows, viz. If the pipe *G* reached all through the water, without passing into the vessel *H*, the gas would not be rendered pure or washed; and if part of the pipe did not rise above the water, the water would have free communication with the tar, besides exposing the retort *A* to a very great pressure, so as to endanger its bursting when red hot. This vessel or receiver *H*, in a large apparatus, is about eighteen inches diameter, and two feet long; the quantity of gas, therefore, which it contains, is sufficient to fill the pipes

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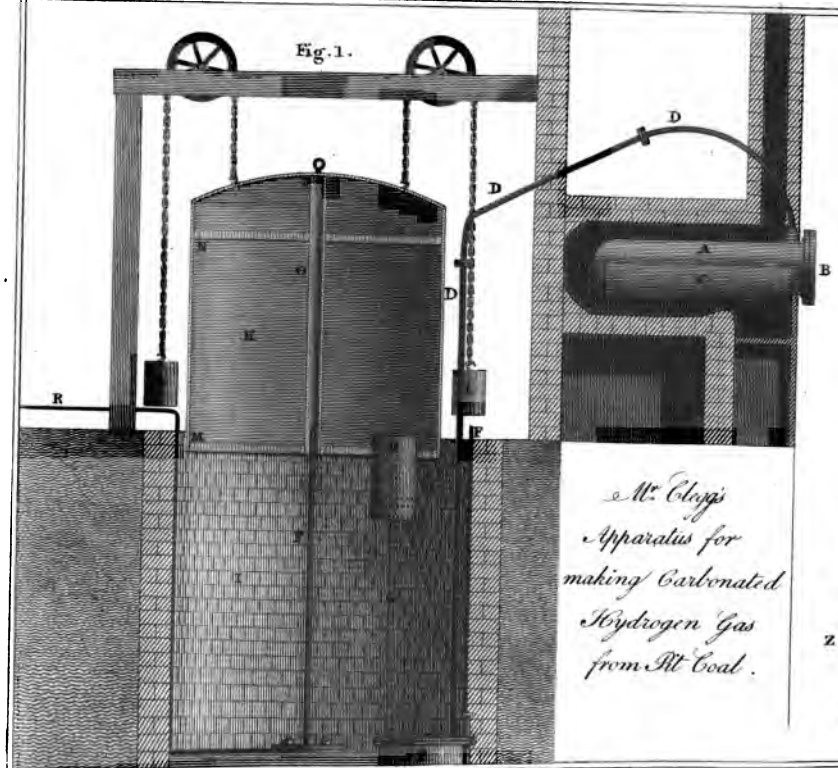
Fig. 1.



Mr. Clegg's Apparatus for making Carbonated Hydrogen Gas from Pit Coal.

Horizontal Section of the Gazometer at the bottom part.

Fig. 2.

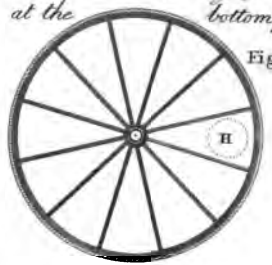


Fig. 4.

Fig. 5.

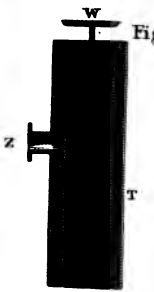


Fig. 6.

Fig. 3.

Engraved by S. Porter

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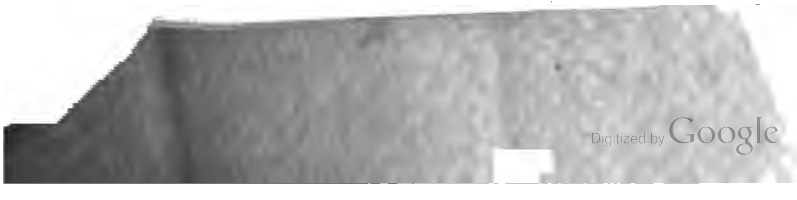
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pipes and retort when cool, and prevents the pipe *G* from acting as a syphon, and exposes the gas to the water without endangering the retort.

When the operation begins, the upper part of the cylindrical gazometer *K*, fig. 1, made of wrought iron plates, is sunk down nearly to a level with the top of the circular well *I*, and is consequently nearly filled with water, but it rises gradually as the gas enters it and displaces the water; the two weights *L L* suspended over pullies by chains keep it steady and prevent its turning round, otherwise the lower stays *M* of the gazometer would come into contact with the vessel *H*. There are two sets of these stays, one shown at *M*, and the other at *N*.

There is also an iron pipe *O* made fast in the centre of the gazometer, by means of the stays which slides over the upright pipe *P*, by which contrivance the gazometer is kept firm and steady, when out of the well; it likewise prevents the gas from getting into the cast iron pipe *P*, and the copper pipe *R*, any where but through small holes made in the pipe *O* at *S* at the top of the gazometer, where the gas is perfectly transparent and fit for use.

The pure gas enters the tube *O* at the small holes made in its top at *S*, and passes on through the tubes *P* and *R* to the lamps, where it is consumed and burnt.

The seams of the gazometer are luted to make them air tight, and the whole well painted inside and out, to preserve it from rust.

Fig. 2 shows an horizontal section of the lower hoop of the gazometer *K* at the part *M*, with its stays or arms, and the manner in which the iron pipe *C*, before described at fig. 1, sliding on the tube *P*, passes through the ring in the centre of the hoop; an horizontal section of the receiver *H* appears therein.

Fig. 5 shows a section of one of the gas lamps; the space between the outer tube *T* and the inner tube *V*, is to be filled with gas supplied by the pipe *R*, shown in fig. 1, where a stop cock is inserted for adjusting the flame, which gas passes through a number of small holes made in the outer edge of a circular plate shown at fig. 6, which unites the tubes *T* and *V* at their tops. *V* is the inner tube which conveys the atmospheric air into the centre of the flame; the upper part of this tube is made conical, or widening outwards, to join a circular plate with holes in it, a horizontal view of which is shown at fig. 6. *W* is a button, which can be placed at a small distance above the mouth of the lamp, and its use is to convey, in an expanded manner, all the air which rises through this tube to the inner surface of the flame, which assists the combustion very much; this button may be set at any convenient distance above the tubes of the lamp, as it slides in the cross bars *XX*, by which it is supported in the inner tube.

A current of air also passes between the glass tube or chimney and the outer tube *T*, through holes made in the bottom of the glass-holder, as in Argand's lamps; this surrounds the flame, and completes its combustion, as explained by the view, fig. 3, and section, fig. 4, which have a glass upon each. *ZZZZ*, figs. 3, 4, 5, and 6, show the tube through which the lamp is supplied with gas from the pipe *R*, fig. 1.

TEN

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TEN GUINEAS *were this Session presented to Mr.* HENRY WARD, *of Blandford, in Dorsetshire, for a Crank useful in working Telegraphs. The following Communications were received from him, an Engraving is annexed, and a complete Model is preserved in the Society's Repository.*

SIR,

BEING one day at the telegraph on the Blandford station, I observed a great inconvenience to attend the working of it in windy weather, and many errors occasioned in consequence. I have since made a model of a crank, which will perfectly remedy these defects, and have herewith sent the model for the inspection of the Society, trusting it will meet their approbation.

I am, Sir,

Your most obedient Servant,

H. WARD.

Blandford, April 20, 1807.

To C. TAYLOR, M.D. SEC.

Reference to the Engraving of Mr. HENRY WARD'S *Crank for Telegraphs See Pl. IX. Figs.* 1 *and* 2.

A front view of this is shown in fig. 1, and a side view in fig. 2. The signal board *a a a a* of the telegraph is of the usual kind, the improvement consists in the crank for moving and retaining it. The spindle the board *a a* turns

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upon, has a small wheel *b b* upon it, to which two segments *d d*, &c. are attached by means of a piece of steel spring fixed at *e*, which always causes the segments to recede from the wheel; the segments have grooves in their peripheries to contain two cords *f* and *g*, by which the signal board *a a* is moved; each segment has a notch in it at *h* and *i*, which notches are a quarter of a circle from each other; *k* is a piece of iron projecting from the frame of the machine, when the signal board is set upright, as in the figures; the notch at *h* receives the piece of iron *k*, and as the segment is pressed towards it by the spring at *e*, by which the segment is fastened to the wheel, it is plain that the force of the wind acting upon the board cannot turn it, as it is locked fast; but when the operator pulls the cord *f*, it draws the segment *d* close to the wheel *b*, this unlocks the wheel, and the signal board is at liberty to be moved by the cord *f* edgeways, when the notch at *i* in the other segment *e* receives the piece of iron *k*, and holds it until again moved to its original position, by means of the cord *g*, which acts in the same manner as *f*.

Remarks on his Compensation Pendulum.

SIR,

In looking over the description of my pendulum, described in the twenty-fifth volume of the Society's Transactions, I perceive there is an error committed, which, if not corrected, will greatly perplex the reader. In page 118, line 1 and 2, it stands thus: "This screw turns in the rod *h h*, passes through the zinc rod *k k*, and screws into the iron rod *i i*." Now the fact is, that the screw does not enter

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enter the iron rod *i i* at all, but goes no further than barely through the zinc rod. It ought, therefore, to read thus: "This screw is tapped into the rod *h h*, but that part of it "which enters the zinc rod *k k* has the threads turned off, "and passes barely through that rod."

I am, Sir,

Your very obedient Servant,

HENRY WARD.

Blandford, August 3, 1808.

To C. Taylor, M.D. Sec.

The Gold Medal *of the Society was this Session voted to Captain* George William Manby, *of Yarmouth, Norfolk, for a Method of preserving the Lives of shipwrecked Persons, and forming a Communication with Ships stranded, by means of a Rope thrown over the Vessel from a Mortar on Shore. The following Accounts were received from him, two explanatory Engravings are annexed, and Models are preserved in the Society's Repository.*

SIR,

When I was last in town, I had the pleasure of meeting you, and saying it was my intention of submitting to the Society of Arts, &c. my invention of saving people from a vessel stranded on a lee shore. I have had the pleasure of putting it in practice with a success beyond what my

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my expectation led me to hope, and I shall take the liberty of sending you the papers in a few days.

I am, Sir,

Your most obedient

Very humble Servant,

GEO. W. MANBY.

Yarmouth, Norfolk, March 4, 1808.

To C. Taylor, M. D. Sec.

SIR,

I request you will do me the honour to lay before the Society for the Encouragement of Arts, Manufactures, and Commerce, the various papers herewith transmitted, respecting my invention for throwing a rope a given distance to a ship stranded on a lee shore, whereby an apparatus can be used to rescue the crew, &c. The idea was suggested from the numerous melancholy events of shipwreck that have happened on this part of the coast, within a short distance of the shore; these determined me to make it a favourite pursuit, and I resolved to persevere in it, until some happy mode succeeded effectually to give assistance on similar occasions. From the distressing day when his Majesty's gun brig, Snipe, came on shore within fifty yards of the beach, when no communication could be procured, I have been making innumerable experiments, but unable to carry them to the extent wished, until the Right Honourable Board of Ordnance did me the honour, on my application to them, to supply such a piece of ordnance, stores, and apparatus, as appeared best calculated to complete my views. They have likewise further complied with my

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my request, and the dangerous stations of Cromer, Happisbro', Winterton, Lowestoffe, and Orfordness, are to be immediately supplied.

The service can be performed in a quarter of an hour from the time of the mortar coming opposite the vessel in distress, when the persons are initiated in the several uses. Models explanatory of its performance I request you will do me the honour to place, for the use of the public, in the Repository belonging to the Society; and as a painting of the subject will convey a clearer idea of the service, and extent of the invention, than it is possible for me to describe, I have directed one to be brought for the inspection of the Committee.

I have the honour to be, Sir,

Your most obedient,

Very humble Servant,

GEO. WM. MANBY,

Captain, R. M. Yarmouth.

Yarmouth, Norfolk, March 28, 1808.

To C. TAYLOR, M. D. SEC.

DEAR SIR,

I HAVE the honour, as Secretary to the Suffolk Humane Society, as well as by the desire of many other persons who attended your experiments at Lowestoffe on the 26th of August, and the 10th of September, to transmit to you their unanimous vote of thanks. I have also added some minutes which I took at the time of those experiments. It gives me peculiar pleasure to find, that those for whose benefit the experiments were principally undertaken, namely, sailors, are fully convinced of the advantage of the plan

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plan you have adopted for securing a communication between the shore and a stranded vessel;

I remain, Sir,

Your obedient humble Servant,

M. MAURICE,

Secretary of the Suffolk Humane Society.

Normanstone, Sept. 21, 1807.

To CAPTAIN MANBY, Yarmouth.

Minutes respecting the Suffolk Humane Society at Lowestoff.

August 26, and September 10, 1807.

Rev. I. G. SPURGEON, V. President, } in the Chair.
Rev. BENCE BENCE, Treasurer. }

ON both occasions, it was unanimously resolved;

1st. That in the opinion of the Suffolk Humane Society, as well as of that of many other gentlemen present, that Captain Manby's experiments for effecting a communication between the shore and a stranded vessel, made by throwing a shot with a rope, appended to it over the vessel, if she be near land; or by a grapnel thrown from a mortar, by which a boat can be hauled over the surf, have completely answered the purpose for which they have been attempted.

2dly. That the Thanks of the meetings be given to Captain Manby, for the zeal and exertions he has shown to promote the object, for which the Suffolk Humane Society was instituted.

3dly. That these resolutions be published in the newspapers, signed by M. Maurice, Secretary.

Mineral

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Minutes of Captain MANBY's *Experiments at Lowestoffe, August 26th and September 10th*, 1807.

A cohorn of four inches and a half bore, weighing three quarters of a hundred weight and one pound, at thirty-five degrees elevation, loaded with four ounces of gunpowder, threw a round shot weighing eleven pounds and a half, to which was fastened a hided rope, and a large deep-sea line, to the distance of one hundred and eighty yards.

At an elevation of thirty degrees to one hundred and eighty eight yards, a field piece of five inches and a half bore, threw a round shot, barbed at the top, weighing thirty pounds, fastened to a whale rope one inch and a half, to the distance of one hundred and ninety yards; the elevation was twenty degrees and a half, and a charge of eight ounces of powder.

The same piece, elevated twenty-five degrees, with a charge of ten ounces of powder, threw a shot similar to the last two hundred yards.

The grapnel with extended flutes, weighing forty-two pounds, and the same rope as before, the piece at an elevation of twenty-two degrees, and a charge of ten ounces of powder, was thrown one hundred and ninety yards. A boat was hauled over the surf, by pulling at the line fastened to the grapnel, which she went to, took up, and returned again to the shore.

M. MAURICE, SEC.

CERTIFICATES.

Norfolk, Great Yarmouth.

JOHN FROUTING, late master of the brigantine or vessel called the Elizabeth of Plymouth, maketh oath and saith, that he was on board the said vessel, when she was unfortunately stranded on the beach of Great Yarmouth aforesaid,

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said, in a violent gale of wind, on Friday the 12th day of February instant. That a rope from the shore was thrown by a piece of ordnance to the distance of one hundred and fifty yards, over the said vessel, and lodging upon her rigging, at which time no other communication could be obtained; and by means of which rope so thrown, he solely attributes the safety of himself and crew. That he could not at the time have used a piece of ordnance, or any rope on board for effecting a communication with the shore, from the rolling of his said vessel and the sea making continual breaches over her; and that the deponent is fully convinced that the invention of throwing a rope to a ship or vessel stranded on a lee shore, is of the utmost consequence and importance to a maritime and commercial country, and interesting to the world at large.

JOHN PROUTING.

Sworn at Great Yarmouth aforesaid, this 22nd day of February, 1808, before me,

EDMUND K. LACON,
Mayor of the Borough of Great Yarmouth.

JOHN YARLEY, Midshipman-gang, and JAMES CLERK late Serjeant of the Cambridge Regiment of Militia, stated, that they were present when Captain Manby effected a communication between the shore and the Brig Elizabeth, in the violent storm of the 12th of February 1808, by means of a rope thrown from a mortar over the vessel, by which rope the people from the beach hauled a boat through the surf to the vessel, and brought out the crew, consisting of the master and four men; and they firmly believe, as stated by the said master, John Prouting, that the safety of him and his crew were solely to be attributed to Captain Manby's invention of throwing a rope to their assistance.

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Copy of a Letter from I. B. HUNTINGTON, *Esq. one of his Majesty's Justices of the Peace for the County of Norfolk, to Captain Manby.*

DEAR MANBY,

PERMIT me to congratulate you on your very successful and excellent experiments, made on Winterton Beach, last Wednesday, by your invention, of saving lives in actual shipwrecks, and to express my entire conviction, that hereafter it will be the means of saving many lives. I have lived in this place upwards of twenty years, and in that time witnessed many dreadful scenes. I can, with the greatest truth, affirm, to have known upwards of one hundred persons to have perished, the greater part of whom might have been saved, had your truly ingenious invention been on the spot. It gave me great pleasure to see the praiseworthy and active part the men on the beach that day evinced, and from whose future exertions much good is to be anticipated.

It has been mentioned to me, that your invention had been before tried, and a premium for the same given by the Society for the Encouragement of Arts, in consequence of which I looked into the records of that Society, and find that in 1791, experiments were made at Woolwich, by Lieutenant Bell, of the Royal Artillery, to throw a rope from a mortar placed in a boat on the river, by which he hauled himself and another person to the shore, on a raft, floated by four casks. I can by no means think this bears any analogy to yours, as every one at all acquainted with the state of a vessel shipwrecked, and the boisterous sea and wind usually attendant, must know the impossibility of such a method being by any means practicable.

The invention of your barbed shot will very often be of the greatest benefit, when, from the severity of the weather, the

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the seamen are rendered incapable of assisting themselves, as your boat, which is, in my opinion, the best I have seen, may be then hauled from the beach. Although your grapnel is not yet brought to perfection, still, from your persevering disposition, I flatter myself that useful part of your apparatus will not be long wanted. As no one knows the necessity of this mode of saving lives more than myself, I most earnestly hope the same will meet with encouragement from the public, and that you may receive the due reward of your merit, is the wish of

Dear Sir, yours truly,

I. B. HUNTINGTON.

Somerton, March 5, 1808.

To G. W. MANBY, Esq.

Minutes of Experiments made by Captain MANBY *at Winterton, March 2, 1808, certified by* I. B. HUNTINGTON, *Esq. one of his Majesty's Justices of the Peace for the County of Norfolk.*

A galloper carriage conveyed from Yarmouth to Winterton the following stores, viz.

One five and a half inch royal mortar on its bed; two ammunition boxes filled; two hundred fathom of one inch and a half rope; two hundred fathom of deep-sea line; twenty fathom of one and a half inch rope, fitted up with two blocks, as a gun-tackle purchase; three iron shod stakes; a large maul to drive them with; a cot fitted up on a stretcher, with gudgeons and fore-lock pins, to convey people on shore; two round twenty-four pounder's shot, with eyes, to form communication; one shot with barbed short flukes to catch the rigging of a vessel, for the purpose of hauling a boat off, when the crew are so benumbed with

yesterday, at Caistor, in my presence, and in the presence of the principal inhabitants of that parish, most of whom have from their infancy resided there, and have been eye witnesses of many sad scenes of shipwreck, which have occurred on their beach, and all of whom (I believe) expressed their thorough conviction, that had the experiments tried yesterday, been within their reach on those agonizing occasions, they might now exult in the glorious reflection of having rescued numbers of their fellow-creatures from an untimely and watery grave. This seemed to be the universal and concurrent opinion of all present yesterday. For my own part, having lived more than thirty years upon the sea coast, I feel no hesitation to add mine to the many respectable testimonies in your possession of the efficacy of your invention, and that by affording a certain and safe communication between the shore and the distressed vessel, you have provided the means of escape to numbers of forlorn, and otherwise lost mariners, even where a life-boat should not be able to reach the vessel's side. But I firmly believe that hardly in any case *this* will be prevented; for I am persuaded that the round shot with barbed points, having been thrown over the ship, and drawn back by the people on shore, (even if the wretched sufferers were so enfeebled or benumbed as to render no assistance,) would lay such hold on the sides, or rigging, as would enable the men in the life-boat to keep the boat's head at right angles with the opposing wave; and that they would, in spite of the most outrageous surf, reach the vessel. This (I am almost confident) might, and would be effected, and for the accomplishment of it, your country, Sir, is your debtor. In short, whether the invention originated with you or not, certain it is, that through *your* means it is become *practicable*, and may be rendered subservient to the noblest purposes,

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Your ol

Ormesby, March 8,

To G. W.

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on the beach at Hasbro', when the Hunter cutter was lost, and although she was within 150 yards of the cliff, no assistance could be given her;—likewise the Abcona of Sunderland. It is in fact too tedious to mention the different ships which I have witnessed being wrecked within the fourteen years I have resided on the coast, and all the hands lost.

The misfortune of this coast is, that when the wind blows strong to the northward, the sea runs up to the cliff, which makes it impossible to get a boat off, or one to come ashore with any person, excepting at some particular places.

I am, Sir,

Your most obedient Servant,

FRANCIS WHEATLEY.

Mundsley, March 14, 1808.

To CAPTAIN MANBY.

SIR,

YOUR having done me the honour to request particularly that I would be present at your experiments, I have made it a point to be so, and have seen with great pleasure, the ardent zeal with which you prosecute the perfection of your excellent apparatus, for the relief of shipwrecked seamen.

That it is extremely difficult, (and in many cases absolutely impossible,) to get a communication with a vessel, I have seen many instances of, especially on the beach between Yarmouth and Lowestoffe, parallel to which runs, for about 60 miles in length, a ridge of sand about one hundred and fifty yards from the shore, on which vessels ground, and on which breaks (in a storm) a tremendous surf, the intervening space between the ridge and the shore being full of a very cross and heavy sea, which forms an eddy, something of the nature of a whirlpool, that baffles every endeavour of the people on board, or on shore, to get communication

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munication with each other; a cask, for instance, or any other floating substance, instead of drawing on shore, turns round, and continues mid-way, and with the wind at, or near north, or south, never comes on shore at all; and I have seen two hours employed in the attempt, which in winter, when the people are perishing fast, owing to their being wet and frozen, is particularly distressing; but in many cases it is absolutely impossible for the men to be on deck, (especially in small coal-laden vessels,) the sea breaking completely over them, as high as their leading blocks, consequently the people are obliged to be in the rigging, and then it is quite out of their power to assist themselves, nor is it possible for the people on shore to give them any, except with the assistance of your excellent apparatus, which I do consider a most effectual relief in such cases of distress.

It has been asserted by some people, that the best method would be, instead of having the apparatus on shore at different stations, to have one on board every ship, so that the shot might be thrown on the beach or rocks, which it is considered would answer best: who made the assertion I cannot tell, but I cannot think it possible to succeed, as will appear when it is considered that in many cases of shipwreck, (especially when the vessel is deep laden,) the men, as I have observed before, are totally unable to keep the deck, the sea completely breaking over it, consequently they are obliged to take to the rigging, where they are soon benumbed by the extreme cold, and quite unable to assist themselves, while those on shore, who are dry, and who have room with exercise to keep their blood in circulation, are the reverse; besides, it takes up a considerable space (more than there is on board small vessels, supposing the men are capable of exerting themselves,) to manage the

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apparatus. In short, many more reasons might be stated, which are equally strong, but I think it is needless saying any thing further on the subject.

The throwing the grapnel I consider a most important part of the business, as without it I conceive it impossible to get a life-boat off a beach similar to the one I have before mentioned; and, indeed, it has always been found impracticable, and seldom attempted when blowing very hard, and a great surf, as the weight of the boat is so considerable when she is struck by a sea, that it is not in the power of any set of men to pull her through, without the assistance of a rope a-head; now the grapnel being thrown by the force of the powder two hundred yards, falls without the broken water, and enables the men to haul her through it without difficulty; and such a new and effectual power is acquired by the invention, as will be the means of saving many valuable lives: for instance, the efficacy of the grapnel may be conceived by a case I will state,—suppose that a ship is on Caton sand, with a flood tide, and the wind blowing very hard at N. N. E. the life-boat at her station at Lowestoffe is rendered useless, because she is too far to leeward to gain the vessel until perhaps the ebb makes, before the ship would be all to pieces, and every soul on board lost to their country and friends. To obviate such a dreadful calamity, it would be proper to put the life-boat into a carriage made on purpose, and by means of the turnpike road which runs parallel to the shore, she is easily conveyed to any point to windward of the vessel on the sand, so as to be able to gain her; but when she is drawn on the beach ready to be launched, the difficulty of getting her through a tremendous surf of one hundred and fifty yards, is insurmountable, without the assistance of your invention of the grapnel, which enables the men employed

to

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to accomplish the task with ease; even supposing the greatest sea possible to be breaking on the beach, the grapnel, together with the life-boat, will save every soul. Now, I do not state this as a case that may happen, but that often (too often indeed) occurs, and really did so to a ship the other day, but there not being either so much wind or sea, as but a very few hours previous to her getting on the sand, the life-boat was able to get off at her station, and by means of horses was towed along the beach to windward of the ship, and passing completely over the body of the sand, without the least danger to any on board her, reached the ship; but had she struck the sand a very short time before she did, the means I have mentioned must have been had recourse to, and the grapnel thrown to haul her off by, as it would have been impossible to have gained the ship any other way, owing to the sea running so very high, that any attempt to get her off at her station would, I have no hesitation in saying, have been quite fruitless.

Before I conclude, I will relate what I was an eye witness of last year, the same morning the Snipe gun brig was on shore, and which I think will prove the great utility of throwing the shot, and endeavouring to get a communication by the means of it.

A large coal-laden brig came on shore on the Gunton beach, a little to the north of the Ness Point, and where it is rather steep, in consequence of which she grounded very near the shore, so that the same sea that struck her broke on the beach, and so very heavy was the surf, that it broke over her as high as her leading blocks, the brig lying broadside to the beach. Being in this dreadful situation, her people were all obliged to take to the rigging for safety, the deck being, by the fury of the sea, completely cleared of every thing; nor was it in our power, although so near

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them, to give any assistance to the poor men, (nine of whom were in the lee main rigging, and two in the fore top,) but were obliged to be silent spectators of the dreadful scene. Had we been so fortunate as to have been provided with your excellent apparatus, I am confident, before the dreadful end of the fatal catastrophe, we should have been able to have saved, with ease, every soul on board, but we were not so fortunate; the consequence of which was, that all but one man were lost to their friends and country for ever. The brig, after laying some time in this situation, parted at the bins, her upper works, masts, and men, all falling together with a most dreadful crash to sea-board, and in a moment the nine poor men in the lee main shrouds were lost for ever to our view. The two men in the fore top were in a better situation, for when the masts, &c. fell, the wind being at north (parallel to the shore) canted them round, and in consequence the mast heads swung on the beach, when one of the men getting from the top to the wreck, by swimming, was lost, the sea being too heavy for him. Such is the dreadful tale, which might have ended differently, had we been provided with your excellent apparatus.

I am, Sir,

Your obedient Servant,

JOHN FOWLER.

Corton.

To Captain GEO. MANBY, Yarmouth.

The SOCIETY of ARTS, &c. have received Certificates of approbation of Captain George William Manby's invention, from the following persons, who have witnessed experiments

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ments made by him on this plan, and state, that the system is fully adequate to answer the laudable purposes of the inventor:

EDMUND K. LACON, Esq. Mayor of Yarmouth.
WM. FISHER, Esq. Deputy Mayor.
WM. DANBY PALMER, Merchant.
THOS. HURRY, Merchant.
WM. HURRY, Merchant.
TIMOTHY STEWARD, Merchant.
B. DOUGLAS, Vice Admiral of Yarmouth Port.
R. CURREY, Captain of his Majesty's ship Roebuck.
RICHARD TURNER, Clerk, Minister of Yarmouth.
CHARLES COBB, Captain, Royal Navy.
THOMAS FORREST, Captain, Royal Navy.
SAMUEL BARKER.
TIMOTHY STEWARD.
JAMES PALMER.
NATHANIEL PALMER.
J. WATSON.
F. R. REYNOLDS.
J. PRESTON.
J. PRESTON, jun.
DOVER COLBY.
JOHN FISHER.
ANDREW YETTS.
B. COSTERTON.
ROBERT WARMINGTON.
M. MAURICE, Esq. Lowestoffe, Secretary to the Suffolk Humane Society.
Sir THOMAS BLOMEFIELD, of the Royal Artillery.
W. PALGRAVE, Collector of the Customs.
J. B. HUNTINGTON, of Somerton.
THOMAS CLOVES, Esq. of Caistor, Lord of the Manor,

WM.

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Wm. Branford, of Caistor.
Francis Wheatley, of Mundsley.
Richard Wortz.
William Pile.
Samuel George.
John Haylett.
Robert Brown.
Matthew Haylett.

A Certificate from William Taylor, Esq. of his Majesty's Navy Hospital, at Yarmouth, states, that he was present when his Majesty's gun brig Snipe was stranded on Garleston beach, and if Captain Manby's plan had been used, the sixty-seven persons lost would all have been saved, being certain of this from what he saw when the Elizabeth was stranded.

By further Certificates from John Pope, James Easter, and Simon Wilson, it appears, that near two hundred and fifty persons have perished between Yarmouth and Lowestoffe within the last twenty years, the greatest part of whom would have been saved upon Captain Manby's plan.

SIR,

When I had the honour of leaving the models with you, the leather case that effectually prevents the rope from burning, and what I conceive to be the first feature in the invention, was omitted: I therefore inclose one, and request you to draw out the present piece of cord, and pass through it the one now fastened to the small ball, taking care the leather goes once round the eye of the ball, to prevent it from slipping up, and the end made fast in the manner represented

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presented by the inclosed. Knowing that the success of the service depends upon the regularity in laying the rope, I have given a plan of the best mode repeated practice has furnished: The fakes should not exceed five or six yards, for if extended to a much greater length, the vibration at each extent (like the pendulum of a clock) becomes so considerable, that a deep-sea line is unable to resist its force, and consequently the object of service is defeated, with the loss of the shot and part of the line. By thus contracting the width of the fakes, will throw the piece of ordnance further from the water's edge, if you wish to have your fakes in one length; to obviate which, and supposing you want to give the greatest possible range, from the stranded vessel being very sharp, or drawing much water, the rope should be laid in different compartments, which I would at all times recommend, particularly should the gale blow on the side, a wind that much oftener brings vessels on shore on this part of the coast, than when blowing dead on the beach; in this case the mortar should be laid behind that compartment most to leeward, to prevent the rope that is running out from getting foul of the next compartment, which would probably be the case if fired from the windward side.

I have the honour to be,

SIR,

Your most obedient humble Servant,

GEO. WM. MANBY.

Barrack Cottage, Yarmouth,
April 5, 1808.

To C. TAYLOR, M. D. SEC.

Refer-

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Reference to the Engraving of Captain MANBY's *Mortar, and Method of laying the Ropes for Communication with Stranded Ships. See Pl. IX. Figs.* 3 *and* 4.

Fig. 3 shows the shot and grapnel; B the leather case which covers the end of the rope, and prevents it from burning C, a part of the rope or deep-sea line.

Fig. 4, D, represents the mortar prepared for firing; E the rope laid in different fakes or compartments, ready to be projected by the shot to which it is attached within the mortar, as fully described in Captain Manby's preceding letter.

Reference to the View of Captain MANBY's *Methods of forming Communications with Ships Stranded, as shown in the last Plate of the Volume.*

A five and a half inch royal mortar is laid at the object requiring assistance, if the wind blows directly on the shore; but an allowance to be made to windward, in proportion as the wind blows on the side, as the body of rope will fall considerably to leeward in that case. The rope requires the greatest regularity in being laid, as on that depends its preservation; it must be short faked, as shown in Plate IX. fig. 4. and care taken that the fakes do not touch each other; the end is passed through a leather case of three feet in length, which effectually prevents the rope burning, and bent to a large eye that projects out of the shot. It being fired over the vessel, the rope falls on the rigging. When the persons on board get it, they are to return a rope by the one sent, to which the people on shore will bend a stout rope, and a tailed block rove with the rope

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Sartorius pinxt. W. Woolnoth sculp.

Capt.n Manby's Method of forming a Communication with Ships stranded.

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rope that had been fired, to get communication; these they will haul on board. The stout rope must then be made fast to any part of the rigging they can depend on; but if the masts are standing, I should recommend that it be fastened to the mast head, just below the cap, for the convenience of getting from the top into the conveyance sent to them, as the people are most likely to assemble in the tops. The other end of the large rope should be tied to a long gun tackle purchase, secured by three iron shod stakes, driven triangularly into the ground. The tackle being bowsed, keeps the rope sufficiently taught, and persons easing off the fall, as the ship rolls, prevent the rope parting, or what it is lashed to, from being carried away. The tailed block is made fast just under the large rope, and one end of the small rope that is rove through it, is bent to the fore part of the cot—the other end to the after-part of the same conveyance. The cot has large eye-let holes in it, to let out water it might catch in dipping through the top of a surf, and lashings to secure the people from being washed out. It is extended by a stretcher of wood, having gudgeons and forelock pins at each end to receive the great rope, and travel on it to and from the vessel, as long as she holds together, for the purpose of bringing on shore the crew, goods, or stores.

In the back scene of the engraving is shown the act of firing a grapnel and rope over a vessel in distress, in order to form a communication with the vessel.

In the fore part is represented the communication formed betwixt a vessel and the shore, with the method of hauling the cot to and from the vessel, by means of an endless rope.

PAPERS

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PAPERS

IN

COLONIES AND TRADE.

The SILVER MEDAL *of the Society was this Session voted to* GEORGE ERRINGTON, *Esq. of Yarmouth, for his Improvements in the Cure of White Herrings, after the Manner of the Dutch Pickled Herrings. The following Communications were received from him, and Samples of the Herrings were produced to the Society.*

SIR,

I BEG leave, through you, to make my claim to the Society for the Encouragement of Arts, &c. for the Premium offered by them for Curing White Herrings, equal to those cured by the Dutch, and shall state the experiments I have made for such purpose.

In the year 1804, having imported a cargo of the best Bay, or St. Ube's salt, I engaged some experienced Dutch fishermen, and sent a vessel of fifty-four tons burthen into the North Sea in the month of July. They were successful in their first voyage, and returned within fourteen days with ninety-six barrels of pickled herrings; and making a second trip, they brought sixty barrels more; all of which I sold to Mr. Timothy Hobbs, No. 146, Whitechapel. I then

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then sent two boats upon the fishery, but both of them returned in the month of September without success.

Determined to prosecute the herring fishery, and finding that the meshes of our nets were smaller than the Dutch, and our fish not equal in size to theirs, I bought a whole fleet of new Dutch nets, and fitted them out for the use of our fishing vessels, at a great expense, and sent the same vessel as before, with nearly the same crew, early in June, 1805, to fish with the busses off Shetland, and the north coast of Scotland, but my vessel returned, after a six weeks cruize, without any herrings, which the crew attributed to the meshes of their Dutch nets being so large that the fish passed through them. The men refused to fish any more with them, and I have laid these nets aside at a total loss. I sent out the vessel again, having put on board her a fleet of our common nets; she soon returned with a full cargo of about one hundred and twenty-nine barrels of good pickled herrings when repacked, which were all sold to Mr. Hobbs, as before.

In 1806, being discouraged by the want of success at so early a period as June, I did not send my boat out till July. After a cruize of thirty-six days, she brought back a cargo of one hundred and ten barrels of pickled herrings; but there being at that time a vast quantity of Dutch prize herrings brought in, the home market was glutted, and my herrings were sold for the West Indies.

This year, not apprehending such competition from the Dutch fish in our market, I sent out the same vessel, which had always been under the same master, Henry Olley, and with nearly the same crew, now well instructed in the art of gipping, &c. and after a three months' voyage upon the coast of Scotland, from the Firth of Forth to Shetland, she brought home one hundred full repacked barrels, and sixteen

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teen half barrels of pickled herrings, of which Mr. Hobbs had fifty-two barrels and thirteen half barrels, cured like the sample now sent to the Society. The other barrels are adventured to Surinam.

The process of curing the herrings, as declared to me by the master Henry Olley, and which, he affirms, he sees that the crew strictly perform, is as follows: The vessel being well provided with good substantial oak barrels, and especially with good strong coarse bay salt, the crew begin gipping the herrings as soon as taken; this operation is the act of taking out with a knife the fat-gut and gills, leaving the rest of the entrails. Upon the dextrous performance of this the art of curing pickled herrings principally depends; this business is the great object of attention, and must be performed the instant that the herrings are caught, that the first drain, or what the fishermen call the life-blood, may be preserved, for it is this which gives the rich flavor to the pickle, and great care is taken that each barrel has some of this blood. Salt is lightly sprinkled over each layer of fish, and the quantity required is about one barrel of salt to three barrels of herrings. After the casks of herrings have stood from twenty-four to forty-eight hours, to settle, they are filled up, well coopered, and closed, and thus remain till the vessel discharges her cargo, when the barrels are opened, and once more filled up, which is termed repacking. The fish are then ready for market. I inclose a certificate from Mr. Hobbs, and if I can communicate any further particulars to satisfy the Society, it shall most readily be done by, Sir,

Yours respectfully,

GEO. ERRINGTON.

Yarmouth, December 1, 1807.

To C. TAYLOR, M. D. SEC.

CERTIFICATE.

SIR,

AGREEABLY to your desire, I hereby certify, that I have bought of you, for several years past, a quantity of herrings pickled after the manner of the Dutch, which were caught and cured by the crew of your boat, Henry Olley master. I had of you this year twenty-two barrels of the first catch, and about thirty-five barrels of the latter. In general I have been satisfied with their quality, and believe that the curing approaches nearer the Dutch in goodness, than any of the British cured white pickled herrings. This year, the first twenty-two barrels were small, but nicely cured herrings, and good flavoured pickle. The last were full roed fish, rather too much salted, but they will keep well, and be better in the spring.

I am, Sir,
Yours, &c.
TIMOTHY HOBBS.

London, November 23, 1807.

To Mr. G. ERRINGTON.

The THANKS *of the Society were this Session voted to Dr.* ALEXANDER ANDERSON, *Superintendent of the Royal Botanical Garden at St. Vincent, for the following valuable Communications received from him.*

DEAR SIR,

I AM honoured with your letter of the 26th and 28th of April, with the 21st and 24th volumes of the Transactions of the Society of Arts; also the publication on the Culture of Black Pepper, for which I feel great obligation to the Society.

From

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From Mr. Martyn's account of the pepper plant, I am in hopes that it will succeed in this garden; as he says it is three or four years before they produce in the East Indies after planting, and it is now near that time since I procured them, and there are several very luxuriant at present. I am happy to find I had adopted the mode of planting them which he has described.

In general I find that East India plants are more rapid in their growth, either from seeds or plants, than the indigenous plants of the country, and arrive at perfection sooner; but the reverse is the case with the Chinese. There is at present in the garden, a large tree of the *Litche*, sent by Sir Joseph Banks in 1788, which, as yet, has made no attempt to flower. I experience the same disposition in several herbaceous perennial plants from China. I was pleased to see a specification of growth of trees in the East Indies, by Dr. Roxburgh, in the last volume of the Transactions, which led me to a comparison of some East Indian trees here, and also of some natives; and I find those from India thrive full as well here as in their native soil. The result I send you. It is a matter of curiosity, rather than utility. It shows the rapid progress of vegetation in tropical climates, compared with that in the colder regions.

Of the numberless articles for commerce and economy, manufactured in the East Indies, no attention is paid to them here, although many of them are common. The same is the case as to small products for necessary existence. This is owing to the want of a proper population, and the high price of manual labour. Except in Barbadoes, and a few other islands, all the land in cultivation is engrossed by the sugar cane. No room is left for poor industrious people, unless in detached spots remote from towns, markets, and shipping. The hard woods fit for mill timber

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are more attended to than any other, and they undoubtedly are the most essential article to the planters, yet few take the trouble to plant them, or give room for them.

You mention the high price of oak bark for tanning. I am confident we have many barks here superior to it. As to the astringent principle, whether our barks are as effectual, or more so, than the oak bark in tanning, deserves experiment. For that end I will transmit you some specimens by the first opportunity. The barks might be imported at a trifling expense, unless the custom house duties should be found to prevent them. The high duties and prohibitions in the custom house prevent several people here from sending similar articles from hence, for experiments, as well as for speculation in trade. A few persons in this island wish to cultivate the cinnamon for commerce; they have asked me if it can be entered at the custom house, and what are the duties upon it? I could give them no information as to either. The overhauling and pilfering by the custom house officers in England, of articles of natural history, sent as specimens, is very injurious; such things should be held sacred.

Many articles here deserve to be subjected to experiments, from which I am prevented, by the necessary attentions to the garden, particularly for some time past. The business of it engrosses all my time and care, and is as much as one individual can attend to.

I will endeavour to obtain a correspondence with Dr. Roxburgh, but I almost despair of it during the war. I have correspondents in America, whom I can depend upon, but the conveyance, through the medium of American vessels to these islands, is very precarious. Some time ago I lost a parcel of seeds from New York, sent in charge by one of these vessels. I believe I mentioned that I have

lost

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lost one of my nutmeg plants, for which I blame myself by too much attention in watering it in dry weather. The other thrives remarkably well, and is now above ten feet high; but if it proves a male, I am at a stand. Could I find the opportunity of sending by a flag of truce to Cayenne, I know I could get a supply.

I am, with most sincere regard,

Dear Sir,

Your much obliged

And ever grateful Servant,

ALEXANDER ANDERSON.

Botanical Garden, St. Vincent,
July 21, 1807.

To C. Taylor, M. D. Sec.

Dear Sir,

I am sorry an untoward circumstance has intervened in my correspondence with you, from which I may appear neglectful of the interests of the Society. It thus happened: On the 21st of July, 1807, I answered your letter accompanying the two volumes of the Society's Transactions, and that part of Martyn's Dictionary treating of the Black Pepper. My letter, as usual, I inclosed to General Melville, but unfortunately he had left London before its arrival. Captain Syms, who was the bearer, could neither find the General, nor get information of his residence. The Captain, a careful man, returned by the last fleet. The letter, with some other papers, as you may wish to know the contents of it, I have now sent.

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I have the pleasure to inform you, that some of the black pepper plants are now pushing out freely their fructification; but have to lament, that the only nutmeg in the garden proves a male, and there is no prospect, at present, of obtaining more, as in the present situation of affairs, no communication from St. Vincent to Cayenne can be had by flags of truce or otherwise. Several plants of it were brought to Trinidad with the colony of the Chinese: I much fear they are, or will be lost there.

I send you some cloves, about two-thirds of the produce of one young tree for the first time. My reason for troubling the Society with them, is from a wish to know whether drying them in the shade or sun is the most proper mode, or if it makes any difference in the quality of the spice; if not, they may be cured in the sun with no trouble, in a very short time. The young fruit I reserved on the tree for seed, part of which was beat off by the wind, and seems to me little inferior to the flower buds.

On reading in the Society's Transactions, Dr. Roxburgh's Experiments on the Comparative Qualities of Bark of East India Plants as Substitutes for European Hemp, I was induced to try the leaves of the *Agave*, to ascertain how far the fibres of them would answer the purpose. I transmit a specimen of them for the Society's inspection. The small bundle, tied with some twine made of the same, is the produce of one moderate sized leaf, and was obtained from it, immediately cut from the plant, in a very short time. The operation was performed by a black boy. The plants are produced in abundance by nature among the rocks by the sea side and barren hills. If found useful, any quantity may be obtained with little labour and no expense of first cost. The superior advantage over the East India articles (most of them common in these islands) is the trifling labour

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bour requisite to get the fibres from the fleshy substance of the leaves without steeping, or any other previous process. When macerated in water, I think it lessens the strength of the fibre, and gives it a dusky hue.

The three small bundles which I now send, were taken from two species common in St. Vincent, viz. *Agave vivipara*, and *A. cubensis*. The leaves of all the tropical species possess much the same properties. By the ancient Mexicans, the Agave was deemed the most valuable production of nature. It is mentioned by all the Spanish writers on America under the name *Maguei*.

It is to be observed, that no article in these islands, however valuable, and whatever encouragement may be held out for its manufacture, will be attended to in their present situation. The sugar cane is considered as the only plant that merits the attention of the planters.

In my last to you I mentioned barks of trees in these islands, which I conceived may become substitutes for oak bark in tanning. I transmit you specimens from five different trees, which are all common, and consequently readily procured, if they prove useful. That of the *maljughra* I know the Spaniards use on the main land with that intention. The quantity of each is purposely small, for the more easy conveyance, and prevention of difficulties at the custom house. However, they may be sufficient for ascertaining their astringent or tanning principle.

In consequence of the war cutting off most of my opportunities of correspondence, the additions to the garden are much less than otherwise they would have been; however, almost every day some thing or other is obtained from some part of the world. What I have long wished for, the Grains of Paradise, are thriving luxuriantly. By the last

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fleet, a number of East India seeds arrived, many of them will be valuable acquisitions if they vegetate.

I am, with the greatest regard,
Dear Sir,
Your much obliged,
Most humble and obedient Servant,
ALEXANDER ANDERSON.

St. Vincent, Botanical Garden,
April 16, 1808.

To C. TAYLOR, M. D. SEC.

Table of the Growth of certain Trees in the Botanical Garden at St. Vincent.

Tectona grandis—The seeds lie in the ground from eighteen months to two years, before they vegetate. They have produced seeds in the garden ten years ago.

			ft.	in.
First seeds received from Sir J. Banks in	1788			
Circumference of stem, in	1807	at 6 ft above ground	4	6
Caryota urens, seeds from Sir Jos. Banks,	1792	Do.	4	10
Sapindus edulis, (Litche) plant from ditto	1788	Do.	4	8
Mimosa Lebbeck, seeds do.	1792	Do.	4	5
Stereulia fœtida, do. do.	1792	Do.	6	0
Gomutu Palm, seeds from Bd. of Agri.	1800	Do.	3	7
Artocarpus incisus, small plants	1793	Do.	6	1
integrifolius, do.	1793	Do.	5	6
Jambolifera pedunculata, do.	1793	Do.	5	9½
Aleurites triloba, seeds	1793	Do.	4	8
Eugenia Malaccensis, small plants	1793	Do.	3	10¾
Mangifera indica, from seeds	1788	Do.	7	0
Ditto, small plants from E. I.	1793	Do.	5	2
NATIVES				
Swietenia Mahagoni, seeds has been producing plenty of seeds for several years,	1790	Do.	3	4
Copifra officinalis, seeds from the Continent	1790	Do.	3	2

One of the most valuable woods.

Mimosa

Mimosa grandis, seedling plant from the Continent	1792	at 6 feet above ground	6	6
A very hard and valuable wood.				
Carolinia insignis, seeds from Trinidad	1787	- Do.	8	0.
The wood of no value.				

St. Vincent July, 21, 1807.

A. ANDERSON.

The THANKS *of the Society were this Session voted to Dr.* WILLIAM ROXBURGH, *of Calcutta, for the following valuable Communications received from him.*

MY DEAR SIR,

IT will give you pleasure to learn that I and my family arrived at Bengal in very good health. I have not had much time to prepare any kind of communication for the Society, but shall not be idle. I trust that I shall, by an early conveyance, receive your letter for Dr. Hunter, the Secretary of our Asiatic Society, to accompany the copy of the Transactions of the Society of Arts. Tell me what is thought of the extract of the Gaub, or Tannin, I sent you prepared from the fruit of DIOSPYROS GLUTINOSUS, or rather EMBRYOPTERIS GLUTINIFERA, *Coromandel Plants, Vol. I, No.* 70; you know you were only just put into a way of getting it from the India house when I left you.

I propose to get Mr. Cowper, the surgeon of the ship we came out in, to carry this, and a sample of the fibres of No. 3 of my last communication, on the Comparative Strength, &c. of the plant called CALOOEE by the Malays, see Vol. 24, page 148. I can cultivate this plant to any extent,

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tent, as it grows readily from slips and cuttings, is perennial, and yields three or four cuttings, or crops, annually; but the cleaning of the fibres from the glutinous fleshy exterior coat, with which they are covered and intermixed, is uncommonly difficult. It has been simply scraped off in the sample I now send you, which I think you may present to the Society, though I fear this letter is written in too great a hurry for their attention. I beg of you to try to procure me all the information you can relative to cleaning such fibres. When the shoots are cut, the bark peels off most readily, but no kind of washing, coction, or maceration, that I have yet been able to think of, is of any use in cleaning or freeing the fibres from the exterior coat; the best way I have yet tried is scraping off this coat, as they do the pulpy part of the wild plantain, or ABACA at Manilla; see Annals of Botany, vol. 1, p. 200; but such a process will, I fear, be too expensive for Calooee hemp, though I know it is much stronger than any thing of the kind I could ever procure from the plantain tree, indeed next to *jeetee*; this fibre is the strongest vegetable fibre known to me.

Remember me to Dr. Bancroft, and tell him I have not forgot the orange dye, Wassuntagonda, a powder procured from the out side of the capsules of my ROTTLERIA TINCTORIA; I must procure it from a distant country.

I have put up two small samples of the Calooee hemp. No. 1 is prepared as before mentioned, by scraping off the exterior coat as soon as the bark is pulled off. This has been cut and cleaned within these two weeks. No 2 is the bark peeled off and dried in that state, and is about one year old, consequently done while I was in England. No. 1 seems to me to be as clean as the generality of Russian hemp. Pray let Lord Dundonald see this substance, and make my best respects to his lordship when you see him; he

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he may be able to advise me how to proceed in cleaning it in the first instance.

I have been this instant looking over the twenty-first Volume of your Society's Transactions, and think it may be agreeable to you to know that the tree which yields the *Gum Kuteera*, page 423, is my STERCULIA VILLOSA, and No. 1196 of my Drawings and Descriptions of Indian Plants, sent to the Honourable the Court of Directors.

I am, &c.

W. ROXBURGH.

Calcutta, Sept. 20, 1807.

To C. TAYLOR, M. D. SEC.

MY DEAR SIR,

SINCE I wrote to you, on the 20th September, by the Surgeon of the Baring, who carried for you samples of the Malay hemp, called Calooee. I have received your letter of the 7th of March, intended to overtake me at Portsmouth, and I thank you for the pains you have taken about my Myrobalan galls. If the value of them is, by this experiment, ascertained, I shall the less regret the great loss I have sustained by them. You will be able to learn this from Mr. Desanges, and let me know.

You have now learned how to get a Treasury Order for any thing I may send the Society, I shall therefore be encouraged to trouble you oftener, and just now with four pounds and a half of the extract of Gaub fruit, (EMBRYOPTERIS GLUTINIFERA, *Coromandel Plants, Vol. I. No.* 70,) which is at this instant in perfection, and the extract is made with cold water. The former, which by the above mentioned letter I learn you were about to receive, was made

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made with hot water. The fruit to make this quantity of extract, four pounds and a half, cost sixpence, and the expense of making may be as much; this information will the better enable the Society to ascertain whether or not it can be useful to tanners, or others, in England. The rate of freight you can better determine than I can here.

The little box is not quite full with the extract. I have filled it with Calooee hemp, the produce of the second cutting of the same plants in two months, so I may safely conclude four crops, or cuttings, may be had annually.

I am, &c.

W. ROXBURGH.

Calcutta, Nov. 3, 1807.

To C. TAYLOR, M. D. SEC.

MY DEAR SIR,

To convince you that I have not forgot the Society nor you, I send you, above, copies of two letters which I have written to you since my return to this place. I also inclose a letter from the Secretary of the Asiatic Society, to convince you that I have been a faithful agent for establishing connections between the two Societies.

If you value our labours as we do ourselves, the original Calcutta price of each volume being fifty rupees, or half crowns, you will also see we have not been insensible of the attentions of the Society of Arts.

I am not relaxing in my pursuit after substitutes for hemp and flax; some more experiments are beginning, and are very far advanced, which promise success, that is, cultivating our sun, or Indian hemp, during the dry season, as practised at or near Bombay, and at Malabar, where their

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their sun or hemp has been reckoned in London equal to, if not better, than the best Russia hemp.

Canvas is now made here in very large quantities, by two or three clever Europeans, from the common sun plant of this country, of so very good quality, as to have nearly superseded English canvas throughout India. This is gaining a great point, if England should ever be pushed for the raw material, as the freight of canvas from hence to Europe will be trifling when compared to the freight of the raw article.

I was told in England that lignum vitæ was becoming scarce and dear. I am inquiring after a substitute, but hitherto without any pointed success. Should I meet with any kind of wood that promises well, I will send the Society a specimen, and another specimen of a kind of very beautiful elegantly veined black wood for furniture, called here *Seet-Saul.*

I remain, your's, very sincerely,

W. ROXBURGH.

Botanic Garden, near Calcutta,
Feb. 9, 1808.

To C. Taylor, M. D. Sec.

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AGRICULTURE. CLASS I.

No.

CV. A MODEL of a swivel-headed Churn Staff, to facilitate the making of Butter, by Mr. T. Fisher. See page 131.

CVI. A Trocar and Canula for discharging the rarefied Air from the Stomach of hoven Cattle, by Mr. W. Wallis Mason. See page 128.

CVII. A Specimen of English Rhubarb, by Mr. William Maud. See page 249.

CHEMISTRY. CLASS II.

XII. Samples of Linen Cloth painted in Oil Colours for Hammock Cloths, by Mr. William Anderson. See page 135.

XIII. Samples of Fruit preserved without Sugar, by Mr. Thomas Saddington. See page 145.

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Manufactures. Class III.

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XLVI. Ropes and Sacking made from Sheeps' Wool, by George Whitworth, Esq. See page 153.

XLVII. A Steel Cutter for Silk Shag Edgings, by Mr. Peter Tansley. See page 164.

XLIX. A Specimen of a Manufacture to preserve Fruit Blossom from Blight, by Colonel Samuel Taylor. See page 250.

Mechanics. Class IV.

CCLIII. A Model of an improved Jury Mast, by Captain William Bolton, R. N. See page 167.

CCLIV. A Model of an improved Anchor, by Captain H. L. Ball, R. N. See page 170.

CCLV. A Model of improved Fish Hooks for Anchors, by Captain H. L. Ball, R. N. See page 170.

CCLVI. A Model of improved Iron Knees for Ships, by Mr. Wm. Roberts. See page 173.

CCLVII. A Model of a new Telegraph for conveying Intelligence, by Major C. Le Hardy. See page 180.

CCLVIII. A Model of the Swedish Telegraph for conveying Intelligence, by Sir A. N. Edelcrantz. See page 184.

CCLIX. An Iron Plug for raising large Stones, by Mr. R. Richardson. See page 190.

CCLX. A Model to show how a Door may open over a Carpet, by Mr. F. Tad. See page 196.

CCLXI.

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CCLXI. A Wrench for Screw Nuts of various Sizes, by Mr. W. Barlow. See page 199.

CCLXII. A Model of a new Crank for Telegraphs, by Mr. W. Ward. See page 207.

CCLXIII. Models of different Articles necessary to relieve Stranded Ships, by Captain G. W. Manby. See page 209.

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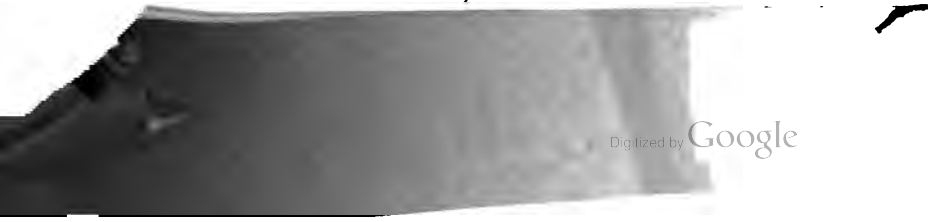
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A

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ANALYTICAL INDEX

TO THE FIRST

TWENTY-FIVE VOLUMES,

OF THE

TRANSACTIONS OF THE SOCIETY

INSTITUTED AT LONDON

FOR THE

ENCOURAGEMENT

OF

ARTS, MANUFACTURES,

AND

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TO THE TERMINATION OF THEIR SESSION, JUNE 1807.

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